NETWORK WORLD
The Newsweekly of User Networking Strategies
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Sun attacks minis with SPARC server

By Susan Breidenbach
West Coast Bureau Chief

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. last week rolled out an aggressively priced network server designed to compete against Digital Equipment Corp.'s VAX and other minicomputers.

Based on a 33-MHz version of Sun's Scalable Processor ARChitecture (SPARC) RISC chip, the SPARCserver 490 is the first system Sun has built from the ground up to be a general-purpose network server.

The SPARC chip is a Reduced Instruction Set Computer (RISC) microprocessor that Sun developed and is trying to establish as the standard microprocessor for Unix systems. Computers based on a RISC architecture use fewer computational instructions and can operate faster than traditional computers.

On the SPARCserver 490, I/O bottlenecks are virtually eliminated by the combination of mainframe-type disk technology and a new Sun-patented I/O cache that speeds up the server's industry-standard VMEbus, the company said.

According to Sun, a SPARCserver 490 can process 22 million instructions per second (MIPS), compared with a similarly config-

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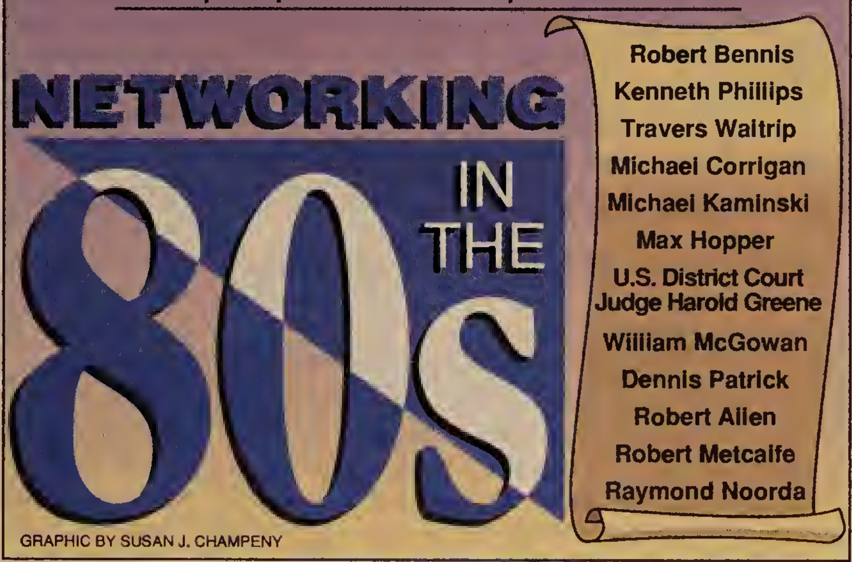
The people who shaped the '80s



GRAPHIC BY SUSAN J. CHAMPENEY

A roll call of leaders: the visionaries of the 1980s

The insightful users, vendors and regulators who charted a course for networking in this decade.

The 1980s were a time of dramatic change and rapid growth in the network industry. In the first of a special three-part series, Network World *examines the people, events and technologies that shaped networking in the '80s. This week: the people.*

By Bob Brown
Senior Editor

The network industry of the 1980s was driven in large measure by a cadre of visionary individuals.

Leaders from the user, vendor and regulatory communities spurred change in the communications marketplace by voicing new ideas, leading by example and laying the foundation for a new regulatory and competitive environment.

The efforts of these people led to greater strategic use of networks, increased vendor competition and improved cooperation between users and vendors.

One of the most significant forces promoting change during the 1980s were users groups, such as the International Communications Association (ICA), which represents about 700 large network users. Many users say they owe a debt of gratitude to Robert Bennis, who retired last year as the director of public poli-

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Lotus looks to LANs with groupware tool

Lotus Notes allows work groups to share data, documents and messages on local, remote nets.

By Laura DiDio
Senior Editor

CAMBRIDGE, Mass. — After five years of preparation, Lotus Development Corp. last week unveiled Lotus Notes, the company's heralded entry into the fledgling groupware arena.

Local-area net-based groupware promises to change the way companies do business, making it easier for groups of employees to work together on a project.

For example, the long-awaited Lotus Notes is a client/server application that lets users on one or more LANs share and revise documents and exchange electronic mail.

It also enables them to create shared applications using a common distributed data base.

The entry of Lotus, one of the major players in the software industry, legitimizes groupware technology, analysts and early users said.

"The fact that Lotus has put its stamp of approval on this product will encourage other big software vendors to develop groupware products. And it tells users that this is the way to go for the future," said David Atlas, senior analyst for electronic messaging at International Data Corp. (IDC) in Framingham, Mass.

At a press conference to announce the product, Lotus introduced several beta users of Lotus Notes — including Price Waterhouse, the New York-based accounting and auditing firm,

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INSIDE

Now then.. once again..When can we expect delivery?

Network World's Holiday Gift Guide, page 71.

Private net users detail SS7 projects

By Bob Wallace
Senior Editor

ORLANDO, Fla. — Westinghouse Electric Corp.'s communications division detailed its migration to a CCITT Signaling System 7 (SS7)-based private ISDN net at a Northern Telecom, Inc. ISDN briefing here last week.

It was also learned at the event that the state of California is planning to implement SS7 in a soon to be constructed statewide, private network that will eventually enable it to offer Integrated Services Digital Network services to end users.

Both users said they hope adoption of SS7, which off-loads signaling from the traffic-bearing net, will speed call setup and teardown, make more efficient use of intermachine trunks and support advanced services such as ISDN.

"Implementing SS7 in a private network is a very expensive

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NETLINE

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R.J. REYNOLDS CUTS costs using EDI and electronic funds transfer. Page 2.

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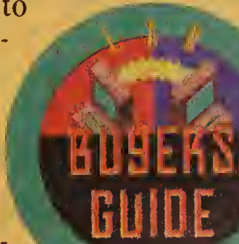
NEWSPAPER

FEATURE

Packet switches, PADs still tops with users

By John Hunter
Contributing Editor



The packet-switching market continues to thrive, despite predictions of doom from some industry experts who say new technologies, such as Integrated Services Digital Network and fractional T-1, will soon replace packet switches and PADs.

In use since the mid-1970s, packet switching is still popular with companies needing to transmit data over dispersed geographic areas. Some organizations have built their own packet-switched nets to handle data traffic, while others use public packet networks.

The two main components of packet nets are the packet switch and the packet assembler/disassembler. The PAD receives data from one or several termi-

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Novell refines DBMS plan, serves up NetWare SQL 386

Company goes after a piece of the relational data base server market with NetWare SQL 386 2.1.

By Laura DiDio
Senior Editor

BOSTON — In a bid to boost its position in the emerging data base server market, Novell, Inc. last week introduced an 80386 version of its NetWare SQL relational data base server at the Database World Expo here.

NetWare SQL 386 Version 2.1, due out in the first quarter of 1990, runs on servers also running NetWare 386. Unlike the initial NetWare SQL product, which was released two years ago as a Value-Added Process running on top of NetWare 286 Version 2.1X, the new offering is a NetWare Loadable Module (NLM).

An NLM is tightly integrated with the underlying NetWare software. NLMs enable users to load and unload server-based applications while the server is running. Value-Added Processes are more time-consuming to load because the user must temporarily shut down the network and then reboot it.

NetWare SQL 386 is three to four times faster than its predecessor, the company said. Novell has also addressed several shortcomings that were in the earlier NetWare SQL version, said Nancy Woodward, vice-president and general manager of Novell's Development Products Division.

Novell has redesigned the pro-

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RJR saves big with EDI, electronic funds transfer

User can shorten lead times for buying goods.

By Paul Desmond
Senior Writer

WINSTON-SALEM, N.C. — R.J. Reynolds Tobacco Co. is saving millions of dollars through its strategic use of EDI and is further cutting costs by collecting payments from customers through electronic funds transfer.

R.J. Reynolds has moved beyond just exchanging invoices and purchase orders with its trading partners. The company has integrated electronic data interchange with its mainframe-based applications to automate what were once time-consuming manual tasks. For example, an inventory system can automatically generate purchase orders that are delivered via EDI to suppliers.

Bob Coil, vice-president of administrative and treasury operations for R.J. Reynolds, said, "I think it's safe to say that savings [from EDI] are several million dollars a year."

Those savings, which Coil put in the $5 million to $10 million range, come from labor reductions and shorter lead times for buying goods, resulting in smaller inventories.

The company is also sold on the benefits of electronic funds transfer, which it uses to collect payments from customers. Getting paid through electronic funds transfer means R.J. Reyn-

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Codex LAN group unveils high-speed Ethernet bridge

By Paul Desmond
Senior Writer

CANTON, Mass. — Codex Corp. last week entered the local-area network interconnect market with the announcement of a high-speed Ethernet bridge and the promise of additional related products to follow.

The 6310 EtherSpan Bridge is the first product from Codex's new LAN internetworking group. That group is headed up by C. Kenneth Miller, who rejoined Codex after a nine-year hiatus during which he founded Concord Data Systems, Inc. and Concord Communications, Inc. He will oversee a staff of 20 and will have Codex's established distribution and support staff at his disposal.

The 6310 connects Ethernets over T-1 links and is described by Codex as a multiplexing bridge because, unlike other bridges, it supports the T-1 D4 framing format. Use of D4 breaks a 1.544M bit/sec T-1 span into 24 64K bit/sec channels and lets users employ any multiple of those channels, from one to 24, depending on their requirements.

That feature makes the bridge compatible with fractional T-1 services, something its competitors can't claim, Miller said. It also means a single 6310 can support links to multiple remote sites when connected to an intel-

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Briefs

Nynex hooks up with Prodigy. In its biggest information services effort to date, Nynex Corp. last week announced it will build and operate computer centers supporting Prodigy Services Co.'s information services in select Northeast markets.

Nynex Computer Services Co., a division of Nynex Information Solutions Group, Inc., will provide data base storage and retrieval services in addition to managing minicomputer facilities and data communications services to support the delivery of Prodigy services.

Prodigy, a joint venture of Sears, Roebuck and Co. and IBM, provides information and shopping services. The agreement is expected to enable Prodigy to expand more quickly.

Litton signs AT&T to voice/data deal. AT&T last week announced that it has signed a three-year, $21 million contract to provide voice and data network services to Litton Industries, Inc. Officials of Litton, a Beverly Hills, Calif.-based provider of electronic, defense and industrial automation systems, said the company expects significant savings with the new network. Although it is anticipated that AT&T will offer the network as a Tariff 12 deal, it has not yet filed any documents with the FCC. Also last week, AT&T signed a Tariff 12 contract with an unnamed customer that is expected to be worth $175 million over five years.

AT&T eases int'l service constraints. AT&T last week said it will support connection of local 64K bit/sec dedicated circuits to its International Accunet Digital Services and Skynet International offerings. Previously, in order to get a dedicated, 64K bit/sec international circuit, a user had to purchase a T-1 line. Since 64K bit/sec circuits are common abroad, this often forced users to spend more for the local access portion of an international link than they needed.

AT&T's new International Accunet Digital Direct Link Services will be available first in New York and elsewhere later. Pricing will vary by region, but an AT&T official said a 64K bit/sec link running from New York to the U.K. using this service would cost $3,690 per month.

US West, Soviets plan global net. US West, Inc. last week said it is teaming with the Soviet Union and seven foreign telecommunications companies to form a corporation that will develop a $500 million fiber-optic network linking Japan, the Soviet Union and Europe.

The organization, dubbed the Trans-Soviet Line Development Corp., will support the construction of the world's longest fiber network. The net will traverse the Soviet Union and have undersea links to Denmark, Italy and Japan.

The project, which is expected to take from three to five years to complete, is designed to serve the growing need for communications capacity between the Pacific Rim and Europe. The project is expected to get under way in mid-1990, pending approval by U.S. and European governments to export high technology to the Soviet Union, according to a US West spokesman.

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Data Communications
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As Global Competition Intensifies, Information Systems Must Change From A Service Function To A Competitive Weapon.

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NCR

DEC widens its line of image tools

By Tom Smith
New Products Editor

NEW YORK — Digital Equipment Corp. last week introduced DECimage Storage Manager, image management software that will enable users to locate and retrieve images stored on a variety of peripherals.

The company also upgraded two existing software packages: DECimage Application Services, a developer's tool kit for creating imaging applications; and DECimage Scan Software, which enables users to manipulate images within applications. Both packages can now run on Reduced Instruction Set Computers (RISC) running Ultrix, DEC's version of Unix.

In addition, DEC announced alliances with 10 vendors whose products and applications will work with the DECimage line of imaging products, which includes an image scanner, DECimage Storage Manager and the two upgraded software packages.

DECimage Storage Manager Version 1.0 uses a client/server architecture. It includes a server component for a VAX host running VMS Version 5.3 and DECnet VAX Version 5.3, as well as client components for workstations that are DECnet Phase IV end nodes.

The software uses electronic keys to identify the location of stored images. Users access these keys from a DEC data base and use them to retrieve images needed for specific applications.

Images can be stored on a variety of magnetic or optical storage devices, including DEC's RV64 Write-Once Optical Jukebox, the Inspire erasable optical storage system from Alphatronix, Inc. and write-once read-many optical storage systems from Eastman Kodak Co., according to Norman Goldberg, DEC group manager of image systems and financial systems.

DECimage Storage Manager license fees range from $112 to $1,125 per node for the client software, depending on the workstation, and from $3,100 to $31,000 for the server portion, also depending on the system. The product will be available in January 1990.

Software upgrades

DEC also enhanced the two DECimage software products, which previously ran only in VAX/VMS environments.

DECimage Application Services is a set of routines used in applications that support the scanning, viewing, printing and adjusting of image data. The documentation provides customers with examples of how to use the routines in BASIC, FORTRAN and C programs.

The tool kit was also upgraded to support gray scale, or photographic, images, as well as color image processing. Version 1.0 supported only black and white images.

Users in insurance and financial industries could use the product to develop business-specific applications, Goldberg said. A mortgage or insurance application, for example, could be digitized to eliminate the need to make and physically transfer multiple copies of a document.

DECimage Application Services Version 2.0 license prices range from $1,000 to $31,000, depending on the size of the system and the number of users. It will be available in January 1990.

In addition to support for RISC/Ultrix environments, DECimage Scan Software Version 2.0 has been enhanced to support a wider range of scanners than the earlier version, which previously supported only DEC's MD300 Scanner, which was announced in January 1989. It will also support scanners from Improvision in Emeryville, Calif., and Eastman Kodak.

The software is a DECwindows application that gives users a consistent interface to capture and control black and white, gray scale and color documents scanned from Digital Document Interchange Format files.

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Correction: The article "Hospital looks to distributed net cure" (*NW,* Oct. 30) incorrectly identified Interlink Computer Sciences, Inc. of Fremont, Calif., as the Interlink Group of San Jose, Calif.

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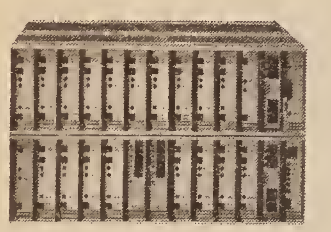

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Defense Dept. to embrace ANSI X12 EDI standards

Seeks greater flexibility, reduction in net traffic.

By Tom Smith
New Products Editor

WASHINGTON, D.C. — The U.S. Department of Defense last week said it is embracing ANSI X12 EDI standards to reduce network traffic and get greater flexibility in creating EDI documents.

Current electronic data interchange formats developed by the department impose restrictions on the size of an EDI document transmitted across internal networks.

In addition, format constraints require users to transmit groups of similar documents separately instead of transmitting them as a single file, creating unnecessary network traffic.

Consequently, the department, through the Modernization of the Defense Logistics Standard Systems (MODELS) program, will support X12, a set of standard EDI formats that enable users to develop EDI messages of varying lengths.

All EDI documents that conform to the department's Defense Logistics Standard Systems (DLSS), a set of procedures that govern the creation and transmission of EDI messages, will be translated to X12 formats.

One of the most common uses of EDI in the department is to requisition food and other supplies by using the Military Standard Requisitioning and Issue Procedures, which includes DLSS.

Current DLSS documents must be enveloped in 80-column messages, with separate fields representing information such as stock number and quantity, each requiring variable column lengths. The columns are analogous to characters.

Under this format, longer transactions required complex coding schemes, with a letter or number representing several pieces of information.

"MODELS will almost be like magic after 27 years of trying to fit things sideways into an 80-column record," according to Dick Allen, supply systems analyst in the Defense Department's Directorate for Supply Management

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AT&T, MCI agree to link public E-mail offerings

By Bob Brown
Senior Editor

Continuing the trend of interconnection in the electronic mail industry, AT&T and MCI Communications Corp. last week announced they will link their public E-mail services by February — a move that was applauded by users.

For the first time, users of both AT&T Mail and MCI Mail will be able to swap messages with one another using an Open Systems Interconnection X.400 gateway between the two services. The agreement, a rare example of cooperation among the telecommunications industry's top rivals, will enable both carriers to add value to their E-mail services by making them accessible to more users.

MCI Mail boasts about 111,000 subscribers. AT&T does not reveal how many AT&T Mail subscribers it has, but industry analysts estimate it supports about 80,000 mailboxes.

George Cunningham, AT&T division manager for messaging, called the agreement "a major victory for E-mail users who want to be able to exchange messages with other users, regardless of the services involved."

Previously, MCI announced X.400 interconnection with messaging services from Dialcom, Inc., Telenet Communications Corp., Italcable and IBM, which runs the IBM Information Network.

MCI was recently chosen as the X.400 service provider for several large users, including Texas Instruments, Inc. and E.I. du Pont de Nemours & Co.

The agreement marks AT&T's 11th X.400 interconnection agreement of the year. Other agreements involved Dialcom, Telenet, Western Union Corp. and seven foreign services.

AT&T, which provides both public and private E-mail offerings, has also certified interoper-

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Days Inns praises new PBX feature

By Bob Wallace
Senior Editor

ATLANTA — Days Inns of America, Inc. has combined a new AT&T PBX call routing feature with the carrier's ISDN Primary Rate Interface (PRI) service to improve the management of its nationwide reservation net.

Days Inns is the first company to use Look Ahead Interflow, an AT&T System 85 and Definity Generic 2 private branch exchange feature that enables users to distribute calls to agents at multiple sites. The company is also the first hotel chain to use the PRI-supported automatic number identification (ANI) feature.

Look Ahead Interflow is being released in a controlled introduction and will become generally available in the first quarter of 1990, according to an AT&T spokeswoman.

The hotel chain says Look Ahead Interflow and ANI have enabled the 700 agents at its reservation centers here and in Knoxville, Tenn., to answer more calls in less time by automatically routing overflow calls from one site to another. Days Inns expects to have handled 10 million calls by year end.

Days Inns has equipped its

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Appeals Court examines Greene decision on MFJ

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Attorneys for the RBHCs, the U.S. Department of Justice and the FCC argued in federal appeals court here last week that U.S. District Court Judge Harold Greene erred when he decided in 1987 to maintain three major Consent Decree restrictions.

The oral arguments before the U.S. Court of Appeals for the District of Columbia were the last step in a suit filed by the regional Bell holding companies seeking to overturn Greene's decision not to lift restrictions that prohibit the carriers from offering information services, manufacturing communications equipment and entering the long-haul market.

Supporters of Greene's 1987 triennial review decision also had an opportunity to argue their cases. Lawyers from MCI Communications Corp., AT&T, the manufacturing industry and the Consumer Federation of America said Greene had reached the correct decision and urged the court to deny the appeal.

The three-judge panel hearing the case must now decide whether Greene incorrectly interpreted provisions of the Consent Decree. If they find such a legal error, they could overturn Greene's

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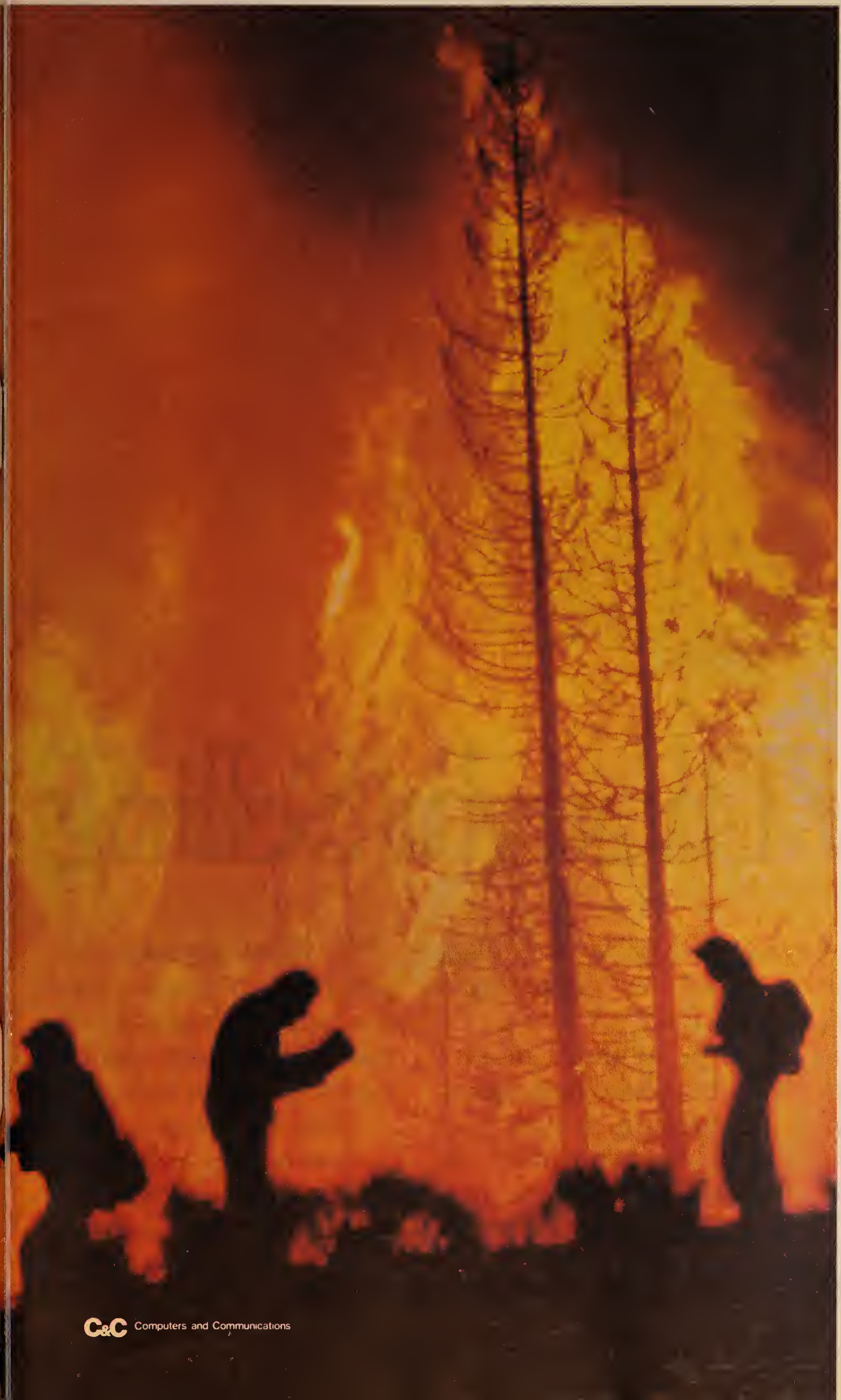

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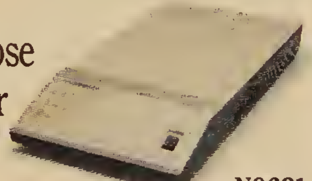
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See the FAXNeT Form on Page #63

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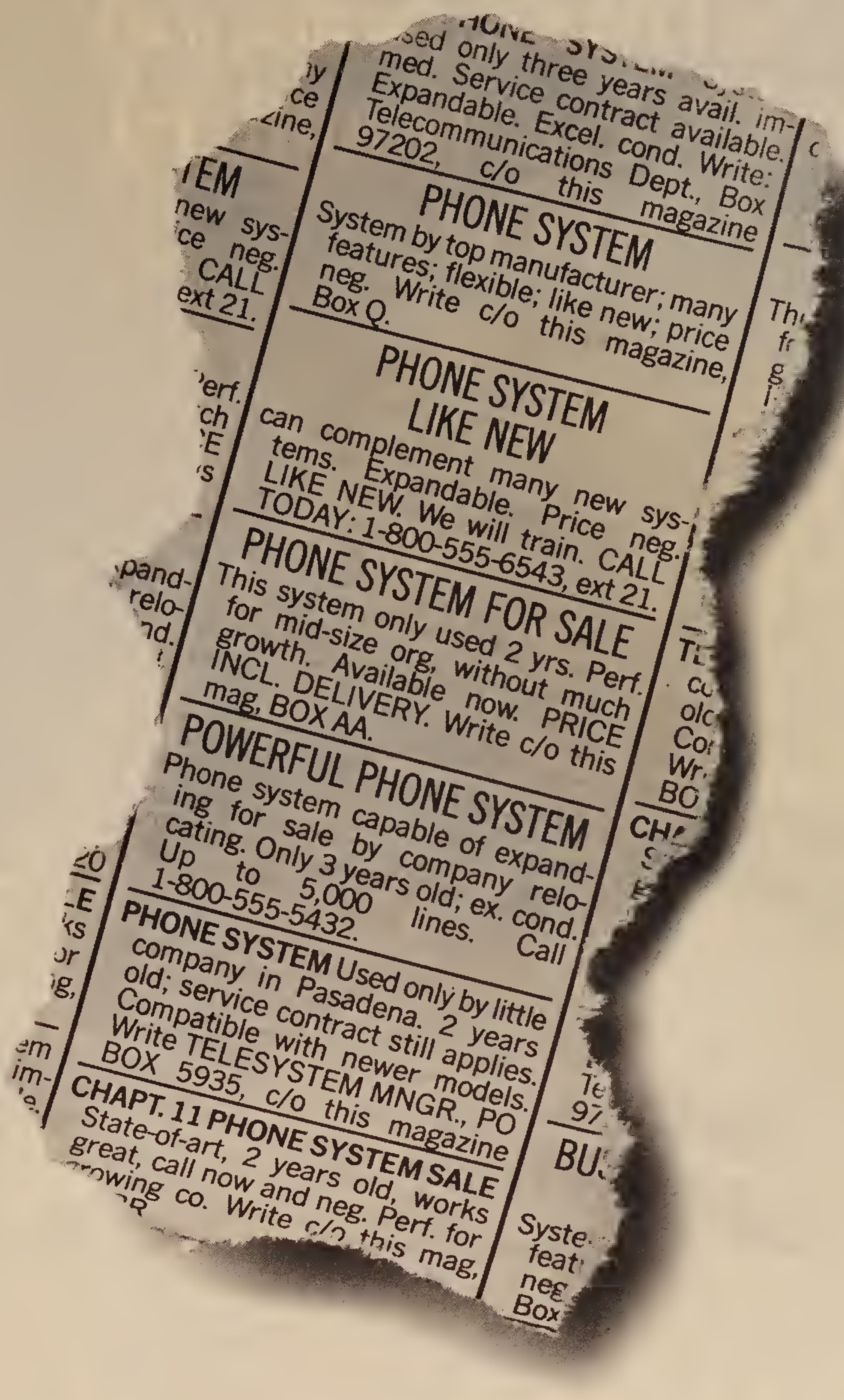

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See the FAXNeT Form on Page #63

General DataComm

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

"Fiber Distributed Data Interface holds great promise for users of many different computer and communications systems. However, vendors of backbone FDDI network products such as bridges and routers must ensure that their products are compatible."

Richard Villars
Senior analyst
International Data Corp.
Framingham, Mass.

People & Positions

US Sprint Communications Co. last week appointed **Gary Forsee**, former vice-president of federal systems with AT&T, to the new post of vice-president and general manager of the US Sprint Network Systems Division in Herndon, Va.

Forsee was one of AT&T's key representatives to government agencies under the Federal Telecommunications System 2000 contract. At US Sprint, he will focus on expanding the company's role in the federal marketplace.

In addition, **Allen Shay** was named vice-president of sales in the Network Systems Division. Formerly, Shay was director of sales to the Department of Defense at Digital Equipment Corp.

Bytex Corp. has appointed **Paul Santos Jr.** technical director of advanced development.

As part of a task force of senior Bytex engineers, Santos will help the company explore new product opportunities beyond its existing matrix switch offerings.

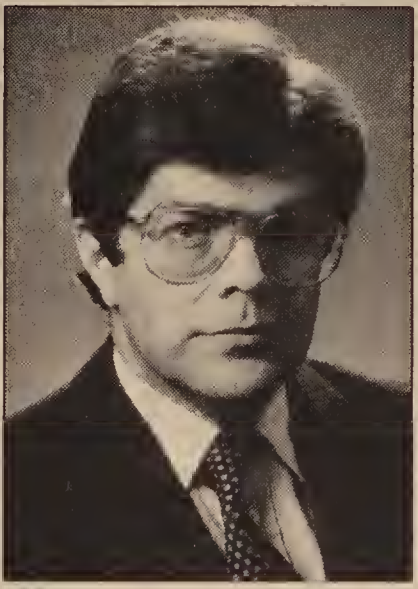
Prior to joining Bytex, Santos was chief engineer at BBN Communications Corp. ☐

Tymnet looms as key to British Telecom's int'l plan

Firm hopes Tymnet will make it a one-stop shop.

By Gail Runnoe
Washington Correspondent

SAN JOSE, Calif. — Less than a month after taking the helm at BT Tymnet, Inc., Mark Baker has laid out a course to integrate Tymnet's strengths with those of its new parent, British Telecommunications PLC, to improve both companies' international networking capabilities.



BT Tymnet's Mark Baker

Analysts warn, however, that BT Tymnet faces stiff competition from companies such as AT&T, GE Information Services and US Sprint Communications Co., which are all equally intent on expanding their international reach.

Last month, upon completing its acquisition of McDonnell Douglas Network Systems Co.'s Tymnet packet-switching net, British Telecom renamed the company BT Tymnet and put its own man, Baker, in place as president and chief executive officer.

Baker was groomed for the spot while serving as marketing director of British Telecom International, Inc. He hopes to leverage international network expertise developed there to take BT Tymnet into new global markets.

Baker takes over for Al Fenn, who was appointed senior vice-president in charge of operations by the new parent. Fenn was Tymnet's general manager when the unit was under McDonnell Douglas' ownership.

Single-source provider

According to Baker, the Tymnet acquisition will allow multinational customers to look to British Telecom to provide global network services on a one-stop shopping basis.

"The ability to give direct and full access between the American

(continued on page 10)

INDUSTRY BRIEFS

IBM last week announced it will cut 10,000 of 216,000 U.S. jobs through attrition and early retirement incentives, and take a $2.3 billion charge against pretax fourth-quarter earnings.

Chairman John Akers said the moves, which do not include outright layoffs, should slash expenses by $1 billion a year.

IBM surprised industry watchers with the aggressiveness of its moves, though some analysts said IBM will need to streamline its operations even more to stay competitive. The new job cutbacks combined with those of the past few years will reduce IBM's U.S. work force by more than 37,000 jobs compared with 1985 levels. The $2.3 billion charge against earnings is largely the result of IBM's plans to consolidate manufacturing operations but also covers severance pay and other costs. To ease investor concerns, IBM said it will buy back up to $4 billion of its stock in blocks of at least 2,000 shares. IBM stock closed the day of the announcement at 99 5/8.

Novell, Inc. of Provo, Utah, last week said it has expanded its national sales organization to focus on selling NetWare products to Fortune 500 companies.

Novell said the move was made to better coordinate its efforts to sell NetWare 386, its most advanced operating system, which it said would appeal directly to large companies.

Prior to the restructuring, Novell's direct sales efforts were spread across five North American sales regions. Direct customer sales are now centrally managed through three national groups: major user market support, integrated software sales and national distribution and retail. An additional group, responsible for field sales management and market development, supports and complements the other three. ☐

Racal's one-stop shop

Racal-Milgo Sunrise, Fla.	Wide-area network products, including modems, T-1 multiplexers, X.25 systems, network management systems (includes recently acquired wide-area net products from Digital Communications Associates, Inc.'s Network Communications Group.
Racal InterLan, Inc. Boxborough, Mass.	LAN products, including TCP/IP products.
Racal-Milgo SkyNetworks, Inc. Charlotte, N.C.	Turnkey VSAT services (a partnership between Racal-Milgo and Telecommunication Enterprises, Inc.).
Racal-Quanta, Inc. Anahelm, Calif.	Fiber-optic modems and multiplexers for LANs.

RACAL

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: THE RACAL CORP., NEW YORK

Racal group aims to shed modem image

Company takes acquisition route to transform from components shop to net systems provider.

By Bob Brown
Senior Editor

SUNRISE, Fla. — The Racal Data Communications Group (RDCG) has had a busy year acquiring companies in an effort to transform itself from a provider of modems to a network systems vendor.

The company deemed such activity necessary, including its proposed acquisition last month of Digital Communications Associates, Inc.'s Network Communications Group, to grow new revenue sources at a time when traditional modem markets are fast becoming commodity markets.

RDCG executives have even begun pushing the concept of one-stop shopping in light of the organization's diversification.

ANALYSIS

Industry analysts applauded RDCG's expansion into new markets, which they described as a way for the group to hedge its bets while investing in growth industries.

However, they questioned whether RDCG will be successful in selling the concept of one-stop shopping, especially to prospects not used to buying a myriad of offerings, such as T-1 multiplexers and satellite communications services, from a single supplier.

During 1989, RDCG acquired expertise in wide-area networks (WAN), local-area networks and fiber optics. The company also established a presence in the satellite communications market by forming a partnership to sell transmission services.

"We have an offering that is unique in the industry," Racal-Milgo President James Norman said last week of the company's newly diverse product line. No other vendor offers the range of LAN and WAN services RDCG now can, he added.

> No other vendor offers the range of LAN and WAN services RDCG now can, Norman said.

▲▲▲

Norman considers RDCG's major challenge in the year ahead to be making network users aware that it now offers networks and is not just a supplier of components, such as modems.

Racal Electronics PLC, the U.K.-based parent company of RDCG, announced an agreement to buy DCA's unprofitable Network Communications Group for $30 million to expand its WAN business ("DCA sells off WAN unit to Racal-Milgo," *NW,* Nov. 27).

The acquisition, which is expected to be completed within two months, would position RDCG to supply everything from backbone T-1 products to low-end modems. Integrating the two product lines should not be too arduous a task since RDCG, which already resells DCA's System 9000 T-1 multiplexers as its Omnimux 9000, previously worked with DCA's offerings, Norman said.

Earlier this year, Racal Elec-

(continued on page 10)

Tymnet looms as key to int'l plan

continued from page 9

and U.K. market is the first and most immediate advantage'' of the acquisition, Baker said.

This ability is not unique to BT Tymnet, however, according to Torrey Byles, an electronic data interchange analyst at Input, a market research firm based in Mountain View, Calif.

Shortly before British Telecom acquired Tymnet, AT&T bought Istel, a U.K. value-added network provider. Byles called the two acquisitions ''a pretty equivalent matchup.''

Over the next two to three years, Baker expects BT Tymnet to extend its interconnection capability to all major economic areas in Europe and the Far East. ''At this stage, there are no companies that can really offer a fully established global one-stop shopping data network service,'' he said.

''What we're going to be concentrating on is building a [global data network] infrastructure in Europe and the Pacific,'' Baker said. He said he expects that when European trade restrictions are eased after 1992, the pace of British Telecom's expansion in Europe will quicken.

Prior to its acquisition by British Telecom, Tymnet had already achieved some footholds in Europe by initiating public and private data network services in France, Germany, Sweden, Switzerland, Australia, Spain and Italy, Baker said. ''We have this embryonic business base we can build on,'' he said.

Kenneth McGee, program director at Gartner Group, Inc. in Stamford, Conn., said it will be important for BT Tymnet to deploy more owned and operated nodes overseas so it can provide international users with a single international network instead of just gateways to services of local post, telegraph and telephone administrations.

Mail merge program

In the U.S., Baker plans to merge British Telecom's existing U.S. electronic mail subsidiary — Dialcom, Inc. — into Tymnet early next year.

''We're looking at combining cost bases so we can deliver services at [the] best cost,'' Baker said.

According to BT Tymnet, Dialcom

(continued on page 62)

At that very moment, a quake measuring 7.1 rocked the San Francisco Bay area. And when it hit, we knew we weren't going to get a lot of calls. Because we knew it would be impossible for many of our customers to reach us. So we went to them.

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Racal group aims to shed modem image

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tronics beefed up RDCG in the U.S. by acquiring InterLan, Inc., a LAN firm now called Racal InterLan, Inc., and Quanta Communications Systems, Inc., a maker of fiber-optic network equipment now called Racal-Quanta, Inc.

In a state of transition

According to Randy Phillips, who was named president and chief executive officer of Racal InterLan shortly after it was acquired, his company is undergoing a transition from being a supplier of LAN protocol software and network interfaces to being a full-service LAN company that will support LAN-to-WAN integration — a key part of RDCG's one-stop shopping plan.

Racal-Quanta provides RDCG with broadband LAN products that complement its WAN offerings, Norman said.

Meanwhile, Racal-Milgo joined Telecommunication Enterprises, Inc. to form a partnership called Racal-Milgo SkyNetworks, Inc., a provider of turnkey very small aperture terminal services. In an effort to better coordinate modem marketing, Racal-Milgo also absorbed the marketing, sales, service and manufacturing functions of Racal-Vadic, a fellow RDCG subsidiary that markets dial-up modems.

''Making acquisitions is the fastest way to get into new markets, but it doesn't always prove to be the best way,'' said Andy Schopick, vice-president of new business development at New Science Associates, Inc., a Southport, Conn.-based market research and consulting firm. ''But it's either invest aggressively through new product development or a combination of that and outside purchases, or die a slow, painful death as traditional markets erode.''

Joaquin Gonzales, vice-president for global networking strategies at Meta Group, a Westport, Conn.-based market research firm, agreed. ''Racal couldn't be a modem vendor forever, so they've taken somewhat of a shotgun approach to expand. Still, I question whether users will come to Racal for VSAT [service], modems and LAN equipment since they are used to buying these products and services from a variety of vendors.''

Coordinate or evaporate

The challenge for Norman, as head of RDCG's biggest entity, is to coordinate the efforts of Racal-Milgo with the rest of RDCG. ''In the future, the issue is going to be who can provide business solutions, and that will require one-stop shopping,'' Norman said. Phillips added that even if users are not ready for one-stop shopping today, they probably will be before long and RDCG wants to be ready for them.

Racal-Milgo is further supporting its one-stop shopping plan by sinking significant research and development dollars into creating a new common architecture that will tie the company's products neatly into hybrid public/private networks and support industry standards, Norman said.

While Norman declined to provide details on the architecture, he said RDCG's network management direction is one that supports emerging standards such as Open Systems Interconnection, AT&T's Unified Network Management Architecture and IBM's Systems Application Architecture.

''We've got to get away from designing products'' without considering how they fit into the customer's overall network, Norman said.

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

Northern Telecom, Inc. last week shipped its 10 millionth Meridian SL-1 PBX line, which will be installed at The Walt Disney Co.'s Walt Disney World Swan Hotel in Orlando, Fla. The switch manufacturer presented the hotel with a commemorative ISDN Primary Rate Interface line card to mark the milestone.

Carrier Watch

Southwestern Bell Telephone Co. recently announced five new Texas-based ISDN Centrex customers: IBM, Mitchell Energy and Development, Inc. , the University of Texas at Houston, Datapoint Corp. and Shell Oil Co.

Southwestern Bell now has 15 Integrated Services Digital Network customers that have contracted for a total of 22,049 ISDN Centrex lines.

IBM's Austin, Texas, facility plans to use its 200 ISDN Centrex lines for research and product testing.

Mitchell Energy, an oil and gas exploration and real estate development firm based in The Woodlands, Texas, will use 679 ISDN Centrex lines for voice applications and to bridge four token-ring local-area networks.

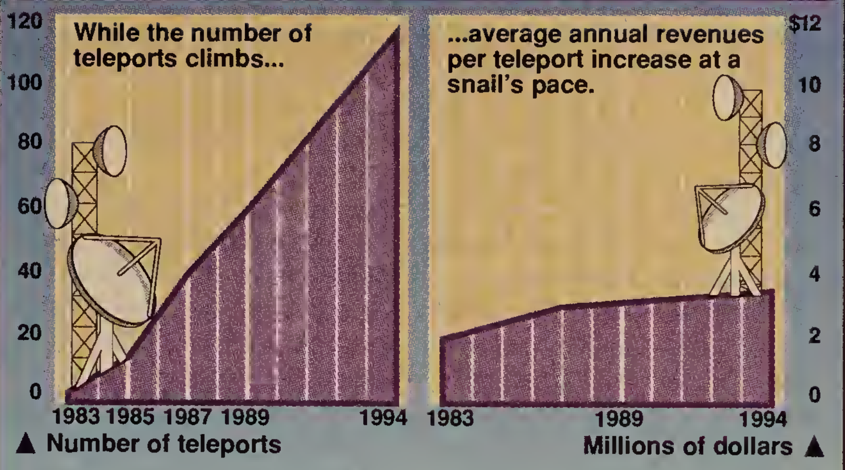
The University of Texas contracted for 485 ISDN Centrex lines for its Texas M.D. Anderson Cancer Center.

The center's lines will be used for medical imaging applications.

Datapoint's international headquarters in San Antonio, Texas, will use 350 ISDN Centrex lines to develop new applications for its Minx full-motion videoconferencing system.

Shell Oil's Deer Park, Texas, office, the petroleum company's fourth location with ISDN, will use 993 ISDN Centrex lines.

Tracking the teleport industry



A teleport is comprised of a fiber or microwave local distribution network and earth stations that transmit domestic and international traffic via satellite.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FROST & SULLIVAN, INC., NEW YORK

Digilog unwraps its first telemanagement system

The Administrator works with PBXs and Centrex.

By Bob Wallace
Senior Editor

MONTGOMERYVILLE, Pa. — Digilog, Inc., a communications test equipment manufacturer, recently introduced its first facilities management product, a system for managing multilocation PBXs, key telephone systems and Centrex service.

The Administrator is an eight-module integrated facilities management system that runs on IBM Personal Computers, VMS-based Digital Equipment Corp. VAXes and MicroVAXes, and IBM mainframes running MVS/CICS.

The Administrator works with private branch exchanges from AT&T, Rolm Corp., Northern Telecom, Inc., NEC America, Inc., Mitel Corp. and InteCom, Inc. It also works with Centrex service provided by AT&T and Northern Telecom central office switches, as well as Northern Telecom key systems.

Each module can generate generic reports, but the system includes a report writer that enables users to create custom reports.

Call Collector devices attached to each switch via an RS-232 port collect call records, and reformat and store them; they are polled at a user-set time.

With Centrex, call records and feature information is downloaded from the central office switch over a Peripheral Unit Controller Data Link to an on-premises call collector. This link must be acquired from the local exchange carrier.

The modules include:

- **Call Accounting,** which enables users to track calling costs. This module uses AT&T, MCI Communications Corp. and US Sprint Communications Co. rate tables to price calls.
- **Directory Services,** which lets switchboard attendants query an on-line directory for employee telephone numbers and locations.
- **Inventory Management,** which can be used to maintain a data base listing communications equipment, services and cabling. The module can be used to open, print and close work orders.
- **Key System Administrator,** which works with the Inventory Management module to track key system equipment and features assigned to end users.
- **Telecommunications Resale,** which enables users to determine call, equipment and service costs for bill-back applications, generates invoices, and tracks accounts receivable and outstanding bills.
- **Bill Verification,** which can be used to match billing data against data collected from the switches and against equipment listed in the Inventory Management module.
- **SL-1 ACD Management Reports,** which can be used to analyze call volumes and trunk use for Northern Telecom's Meridian SL-1 PBX-based ACD.
- **Centrex Services,** which helps users track station moves, adds and changes, and transmit the information over a special link to the central office.

The telemanagement system, which is available now, can be purchased by module, by groups of modules or as an eight-module system.

Digilog sells five Call Collector models ranging in price from $2,500 to $5,400.

Digilog bases system pricing on two components, a platform fee and a software license fee. The Administrator is available now.

VSATs offer option for some voice needs

Satellite technology can be used for emergency backup and to support inaccessible locations.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Although VSAT networks are primarily used for data and video, some companies are considering the satellite technology to support emergency backup links and serve hard-to-reach remote locations.

Users and analysts agree that the popularity of very small aperture terminal networks for voice will always be limited by the propagation delay inherent in satellite transmissions, but technological advances could overcome other problems such as bandwidth constraints.

The typical VSAT today supports transmission speeds up to 56K bit/sec — enough for a few compressed voice channels — but manufacturers are working on systems that could support speeds up to the T-1 rate of 1.544M bit/sec.

Although today's VSATs support limited capacity, analysts said they should appeal to users with locations in hard-to-reach locations, such as drilling rigs, and they offer a good option for customers who want a disaster recovery alternative for terrestrial facilities. The San Francisco earthquake, Hurricane Hugo and the Hinsdale, Ill., fire have made users more conscious of the vulnerability of telephone networks.

Some VSAT users, however, are already taking advantage of their data networks to support occasional voice calls.

A national retailer based in the South, for example, uses its VSAT data network to carry 16K bit/sec voice calls, according to Phil Arst, president of Communication Strategies Associates, Inc., a Cupertino, Calif.-based VSAT consulting firm.

Although voice transmission at 16K bit/sec means reduced sound quality, Arst said it is acceptable. "It's not what we refer to as toll quality, but it's close enough that it's not an irritant," he said.

Arst explained that some brokerage houses are also carrying voice over VSAT systems. The typical application is for "hoot-and-holler" lines, on which voice transmissions from a single point

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WASHINGTON UPDATE

BY ANITA TAFF

Sikes calls for regulatory harmony. Lawmakers and regulators in the U.S. must iron out their disagreements and establish a coordinated telecommunications policy or consumers will suffer, Federal Communications Commission Chairman Alfred Sikes told attendees at the Financial Times World Communications Conference last week. Telecommunications services are governed by judicial, legislative, state and federal regulatory officials, who often have different objectives, he said. "In the U.S., there is a growing appreciation on the part of most state and federal regulators that we must do what we can to avoid burdening industry — and ultimately, those who depend on it for service — with the costs of our disagreement," Sikes said.

The FCC is hoping to lead the way in streamlining regulation and encouraging carriers to invest in future services. As an example, Sikes pointed out that the FCC is allowing AT&T to include investments in Common Channel Signaling System 7 as costs recovered through its rate base. The agency recently allowed AT&T to use accelerated depreciation rates to encourage additional investment. Sikes said the FCC has also encouraged investment in new network facilities by fostering competition in the marketplace.

Despite these successes, Sikes said he fully understood the need for continued regulatory oversight. It is critical, he said, that competitors have a sense "that their commercial success or failure will be a consequence of their individual talent and efforts, and not be determined solely by the actions of dominant firms."

VSATs offer option for some voice needs

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are broadcast to a number of sites. Brokers can listen to a continuous broadcast of traders or analysts giving results for a particular commodity, stock or segment of the market, he said.

Paul Haines, marketing product manager at Contel ASC, said he has a customer who uses a VSAT hoot-and-holler line to call in the location of car parts he finds at junkyards. Contel has also provided voice capabilities for VSAT customers' oil rigs.

Other users, such as David Carlson, senior vice-president of corporate information systems at K mart Corp., are still tossing around the idea of using VSAT technology for voice. K mart currently uses a VSAT net from GTE Spacenet Corp. to support data communications among 1,300 retail stores and distribution centers and plans to add another 900 by 1991.

K mart also uses the VSATs for video broadcasts. But Carlson, who says VSATs are the most reliable technology he has ever worked with, wants to do more with the network. "The question for us would be whether or not we would move voice onto VSAT," Carlson said.

About once a year, the company reevaluates whether it would be feasible to add voice to the network, but it has decided against doing so each time.

Part of the reason is that the terrestrial telephone network provides an excellent pricing structure, Carlson said. He also agreed that propagation delays are often bothersome in voice conversations.

But Carlson said K mart has a corporate commitment to VSAT technology and doesn't rule out future uses of VSATs to carry voice.

Despite some users' enthusiasm, not everyone thinks using VSATs for voice is a good idea. Howard Hecht, a senior research analyst at Gartner Group, Inc., a research firm based in Stamford, Conn., said his firm strongly advises clients against using VSATs for voice. "As an absolute necessity, it's OK," Hecht said, "but it is an inelegant technology for voice."

And Arst said that carrying voice on VSAT can be expensive. He estimated that the typical cost of adding voice cards to VSATs is $2,000 per terminal. He also pointed out that users would have to work with carriers to reserve space segments, which might not always be available. ◘

Sen. bill would let RBHCs make telecom products

By Gail Runnoe
Washington Correspondent

WASHINGTON, D.C. — The regional Bell holding companies' campaign for regulatory relief from current business restrictions got a surprise boost recently when Sen. Ernest Hollings (D-S.C.) introduced a bill that would enable the RBHCs to manufacture telecommunications equipment.

Hollings, chairman of the Senate Commerce Committee and long considered a supporter of the Modified Final Judgment, surprised many by proposing the bill.

The senator said he introduced the legislation "to enhance the nation's industrial competitiveness." The bill would permit RBHCs to research, design, manufacture and market telecommunications equipment for residential and business users, although it did not specify the types of equipment. The bill also contains what is sure to be a controversial clause mandating that the RBHCs limit the design, development and manufacture of products to the U.S.

The Hollings bill is the first piece of legislation introduced in the Senate this year to address the Modified Final Judgment specifically.

Sen. John Breaux (D-La.) filed a resolution last spring calling for the Senate to develop a comprehensive national telecommunications policy. In 1986, Sen. Robert Dole (R-Kan.) filed an unsuccessful bill that proposed transferring jurisdiction of the Modified Final Judgment from the courts to the Federal Communications Commission.

In the House of Representatives, a bill proposing to ease the manufacturing and information services restriction was introduced by Rep. Al Swift (D-Wash.) and Rep. Thomas Tauke (R-Iowa) last April ("Congress mulls latest bill to loosen MFJ restrictions," *NW,* May 1). This bill is still under consideration.

Another House bill that is expected to favor easing RBHC restrictions will likely be filed early next year by Rep. John Dingell (D-Mich.), chairman of the House Energy and Commerce Committee, and Rep. Edward Markey (D-Mass.), chairman of the House Telecommunications and Finance Subcommittee.

The Dingell-Markey bill and the Hollings bill are expected to be the primary legislative vehicles that could lead to Modified Final Judgment relief for the RBHCs in 1990. While they welcomed the Hollings initiative as a step in the right direction, most RBHCs refused to comment on its specific terms until hearings on the bill have begun.

In addition to requiring that manufacturing, including the fabrication of components, take place in the U.S., the bill also specifies that: manufacturing must be handled through separate subsidiaries with no more than 90% of each subsidiary's equity owned by the parent company, RBHCs cannot team with other RBHCs to manufacture equipment, and revenues from regulated services cannot be used to subsidize a manufacturing subsidiary.

The bill would allow RBHCs to buy equipment exclusively from their manufacturing subsidiary, provided they first

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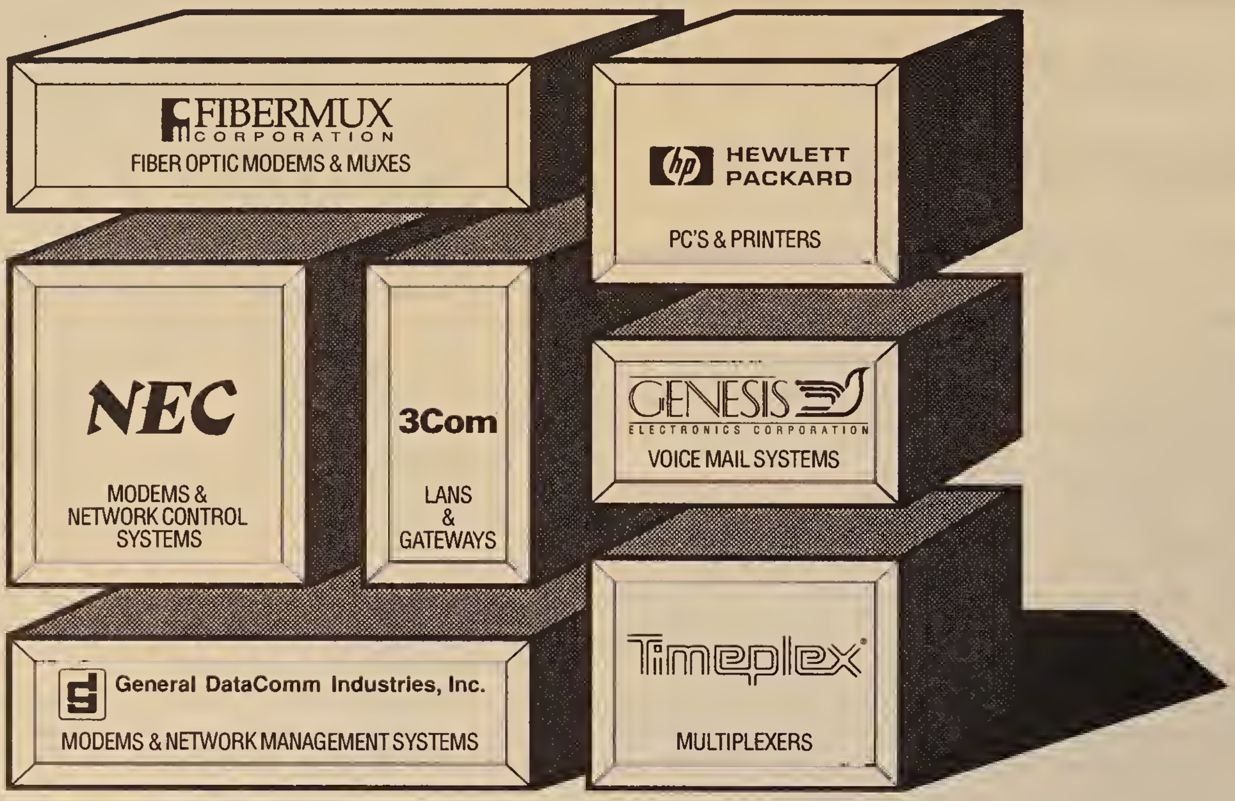
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GTE

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THE POWER IS ON

See the FAXNeT Form on Page #63

Worth Noting

> "If you're a network planner who wants to make sure your equipment stays up and you have a global communications requirement, by definition, you need to rely on satellites and undersea cable."
>
> **Bruce Crockett**
> President
> Communications
> Satellite Corp.'s
> World Systems Division
> Washington, D.C.

Data Packets

Michigan's Department of Social Services recently awarded a $1 million contract to **Bull HN Information Systems, Inc.** of Waltham, Mass., for computer software and network equipment to support the state's automated food stamp issuance project.

Under the plan, Bull will install 150 terminals capable of reading magnetic strip cards issued to food stamp recipients in 68 locations across the state. Those terminals will be linked via dial-up or leased lines to a Bull DPS 88 computer in the Department of Social Services' office in Lansing, Mich.

The network will allow food stamp recipients to pass a magnetic card that resembles an automated teller machine card through a remote terminal to obtain food stamp coupons.

Currently, recipients receive monthly food stamp vouchers in the mail.

Those vouchers must be turned in for actual food stamp coupons at banks or Department of Social Services offices.

Racal-Vadic last week introduced a pair of CCITT V.32 compatible modem boards that operate at up to 9.6K bit/sec.

Both can transmit synchronous or asynchronous data in full-duplex over two- or

(continued on page 18)

DP shop uses FEPs to cut costs, add net applications

Move reduces reliance on leased-line network.

By Jim Brown
Senior Editor

ORLANDO, Fla. — Florida Informanagement Services, Inc. (FIS), a data processing service bureau, is installing more than 20 remote Unisys Corp. CP2000 front-end processors as part of a network redesign to support new applications.

FIS, which provides processing services for over 100 banks with more than 1,000 branches across Florida, is responding to client requests to support new financial management applications that enable bank managers to retrieve large amounts of data from customer information files stored on hosts here.

Currently, FIS supports on-line financial transactions that contain small bursts of data and require changes to a single customer file. FIS also provides batch processing services that enable clients to upload complete daily transaction files for host processing each night.

However, the new applications are extremely data base-intensive, which consumes CPU processing cycles on the hosts before large blocks of data can be transmitted across the network. FIS hosts already support remote terminal polling, which also consumes a fair amount of CPU processing.

The company realized if it was going to support the larger client applications, it would have to free up valuable memory on the mainframes by off-loading terminal polling to remote front-end processors.

FIS also opted for the front-end processor setup as an economical means to reduce its reliance on costly leased-line services. As it turns out, the front-end processors will also resolve a problem FIS had in providing uniform terminal response times to clients on the network.

Currently, client terminals and microcomputers are linked to the data center in a star topology via some 230 9.6K bit/sec multidrop analog leased lines, which terminate into Unisys Network Support Processors (NSP) at the host site. Those NSPs are

(continued on page 18)

AT&T exec shares vision of users' future OSI needs

By Gail Runnoe
Washington Correspondent

CRYSTAL CITY, Va. — Security issues, network management and the development of OSI applications headed the list of user concerns raised here recently at the second annual OSI Product Integration Conference, sponsored by the Corporation for Open Systems International (COS).

The focal point of the two-day gathering was the keynote, in which Paul Bartoli, supervisor of the Systems Architecture Planning Group at AT&T and member of the COS architecture committee, outlined the strategic directions in which he sees Open Systems Interconnection headed.

Bartoli singled out development of OSI network security as a major component of the technology that must be defined to satisfy user demand. He predicted work in this area will focus on peer authentication and confidentiality of data.

Spurred particularly from the demands of the business and banking sectors, he said, "This is something users ask for all the time."

Bruce Korman, president of Flash Communications, a telecommunications and data communications consultancy based in Nashua, N.H., agreed.

"Users are very concerned about [unauthorized] entry of their system," and OSI standards will have to address that concern, Korman said.

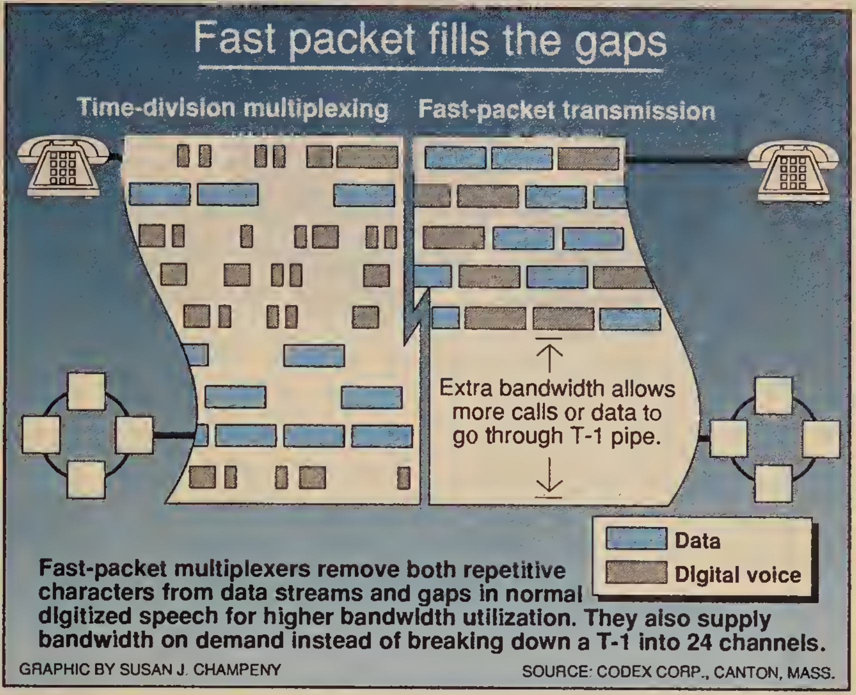
Explosion of work

Bartoli also said application portability and open distributed processing will be important to the evolution of OSI. Application portability refers to the use of a single software application across different types of hardware; distributed processing is the ability to off-load portions of a task among multiple devices in a network.

"The application layer is important because as time goes on, there will be an unlimited number of applications and protocols to go with them. [This is] an area where we're still going to see an explosion of work," he said.

But Korman tempered Bartoli's optimism for the emergence of OSI applications.

(continued on page 16)


Fast packet fills the gaps
Time-division multiplexing
Fast-packet transmission
Extra bandwidth allows more calls or data to go through T-1 pipe.
Data
Digital voice

Fast-packet multiplexers remove both repetitive characters from data streams and gaps in normal digitized speech for higher bandwidth utilization. They also supply bandwidth on demand instead of breaking down a T-1 into 24 channels.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: CODEX CORP., CANTON, MASS.

Fast packet is on the fast track with users

Covia's choice of StrataCom IPX underscores the growing interest in fast-packet technology.

By Paul Desmond
Senior Writer

Covia's recent announcement that it is upgrading its T-1 backbone network with fast-packet T-1 multiplexers underscores the groundswell of interest fast-packet technology is generating among users, vendors and analysts.

Covia said it opted for StrataCom, Inc.'s Integrated Packet Exchange (IPX) fast-packet T-1 multiplexers because it believes the equipment will offer more efficient bandwidth utilization than more traditional circuit-switched multiplexers, especially when mixing voice traffic with data from local-area nets.

Other users of the equipment echoed Covia's sentiments. And vendors of competing equipment, such as Network Equipment Technologies, Inc. (NET) and Timeplex, Inc., on one hand extol the virtues of their circuit-switched T-1 multiplexers, yet admittedly they are experimenting with fast-packet technology.

Covia is not alone among users opting for fast-packet multiplexers, although, as the operator of the Apollo airline computer reservation network, it is one of the more high-profile users.

StrataCom declined to say how many IPXs it has sold to date, but a company spokeswoman said sales this year have almost doubled compared to 1988. About 30% to 40% of those sales are through Codex Corp., which sells the IPX as its 6290, the spokeswoman said.

Frugal bandwidth manager

One early IPX user, Bernie Schneider, director of telecommunications at United Stationers Supply Co. in Des Plaines, Ill., said he chose the IPX in 1987 in part because of the way it integrates LAN data with voice traffic.

"A lot of the bandwidth that you allocate to voice isn't actually being used," Schneider said. The IPX employs a data frame multiplexing feature to take advantage of that unused bandwidth, which results from gaps in regular speech (see graphic, this page). "[It] will bump up the amount being allocated to, say, a LAN bridge so you can get a lot higher throughput and higher utilization on your T-1."

When used with packet switches, NET's Integrated Digital Network Exchange (IDNX) multiplexers offer the same, if not better, functionality, said Charles Giancarlo, NET's director of program development. Packet switches operate in store-and-forward mode, which means they can slow down traffic coming from a LAN if necessary, Giancarlo said. The IPX can't slow LAN traffic but rather sends out bursts of data as it arrives, which can interrupt voice packets if the T-1 circuit is overloaded, he said.

> "A lot of the bandwidth that you allocate to voice isn't actually being used."
>
> ▲▲▲

But IPX users refute that contention. Schneider said he can at-

(continued on page 16)

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Fast packet is on the fast track with users

continued from page 13

tach devices that could potentially produce 2M to 3M bit/sec of traffic to a single T-1. "We know statistically that not everyone's going to get on at once," he said. "And if they did, there's a priority scheme that we set." The only time that priority scheme has resulted in voice or data getting bumped off the T-1 was when there were multiple circuit outages, he said.

Besides support for LAN connections to its wide-area network, Covia chose the IPX because it viewed the product as well-positioned to support emerging high-bandwidth applications such as imaging, according to Tom Holloran, Covia's manager of tactical planning.

"As we go to imaging products, mixing voice and data on the network [and] using intelligent networks, [it results in] more data crossing the network," Holloran said. "That means there's more incentive to be efficient and cost-effective."

Timothy Zerbiec, a principal with the Dedham, Mass., consultancy Vertical Systems Group, said more users are likely to follow Covia's lead, especially companies looking to supplement existing T-1 networks with smaller T-1 backbones to support new applications such as image data bases. Users of such data bases "will need lots of bandwidth, but they're not going to need it all the time," Zerbiec said. "That's where the dynamic bandwidth assignment in fast packet is very valuable."

Dynamic bandwidth assignment refers to the way the IPX supplies voice or data bandwidth as needed, as opposed to users having to dedicate channels to either voice or data. Some circuit-switched multiplexers, such as NET's, support a similar feature.

Fast-packet technology is also more efficient than circuit switches in routing around failed nodes or T-1 links, Zerbiec said. Circuit switches establish end-to-end links for a length of time and should any portion of the link fail, it has to tear down the entire link and reassign the traffic all over again via an alternate route.

"With fast-packet switches, you haven't established an end-to-end link on a fixed basis," he said. "It's put on there as bandwidth is required. That gives it a much faster reconnection time."

Most circuit switches take five to 15 seconds to reconnect in case of a line failure, Schneider said, whereas the IPX takes about two seconds. "Users will hang on the phone if there's a two-second interruption," he said. "Once it gets over about four or five seconds, they start hanging up.

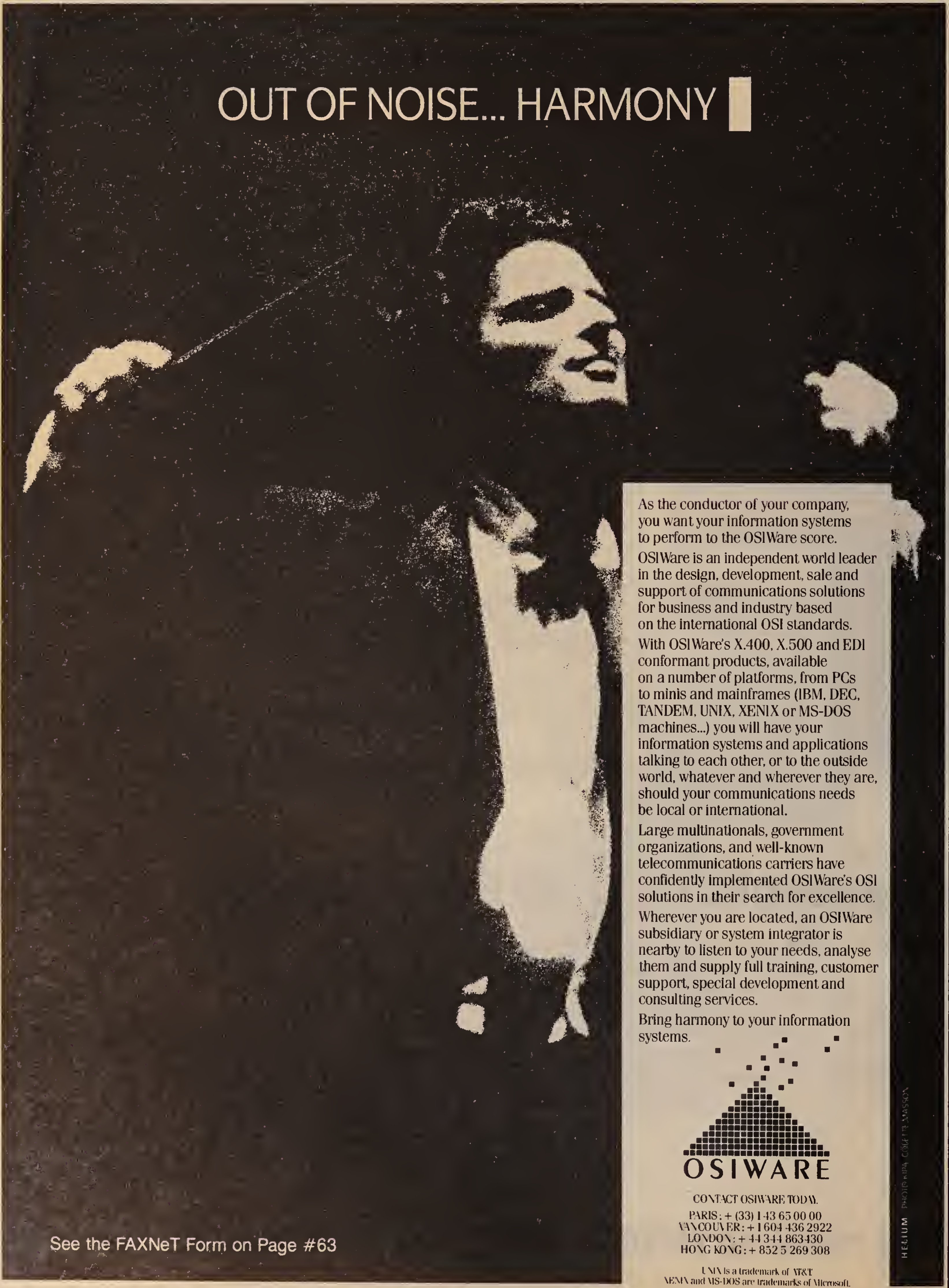
"For data sessions, you can tune the tolerance according to SNA but somewhere around three or four seconds, it starts to really back up your SNA network," Schneider said.

Winning the relay race

Another reason Covia chose the IPX was StrataCom's commitment to frame-relay technology, Holloran said.

Frame relay is an emerging standard for a packet interface that defines a routing and addressing scheme so that from a single port on a backbone, data can be routed to any other port, said David Owen, StrataCom's director of product marketing. Today, data from any one IPX port can be routed to only one other remote port; consequently, if a user on one LAN needs links to three other LANs, it requires three IPX ports. With frame relay, one port would support links to any number of other ports, Owen said.

NET's Giancarlo, along with a spokesman for Timeplex, Inc., said their companies are investigating frame-relay technology. NET, however, describes frame relay as an emerging standard that defines how to switch packet frames within the 64K bit/sec D channel of an Integrated Services Digital Network Primary Rate Interface line. NET is also investigating fast-packet switching, which uses a fixed frame size, and fast frame switching, which uses a variable frame size, Giancarlo said. ◘



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See the FAXNeT Form on Page #63

Exec shares vision of users' future needs

continued from page 13

"We have to first build standards at the top [of the OSI model] so applications can talk to applications," Korman added.

Only a handful of OSI applications currently exist, including Message Handling System; Directory Services; Office Document Architecture; File Transfer, Access and Management (FTAM); and Virtual Terminal.

Ken Norland, vice-president of systems development at Distributed Systems Solutions International, a Los Angeles-based consultancy specializing in OSI migration strategies, said transaction processing applications in OSI networks will also be in big demand next year, as will network management capabilities.

Piggybacking on ISDN

Bartoli also said users will be looking for ways to meld Integrated Services Digital Network and OSI, in an effort to use emerging ISDN services as a low-cost transmission alternative.

But much work remains to be done before users will be able to exploit ISDN capabilities at the OSI application layer, he said.

Bartoli credited user/vendor consortia — such as Unix International, Inc., the Open Software Foundation and COS — as being instrumental in helping nurture OSI. In addition, implementation workshops have also helped define standards, while conformance testing organizations — such as COS and the Standards Promotion and Application Group — have helped lower vendors' OSI costs, he said.

"If each vendor had to build their own conformance test systems, it would take a lot of resources," he said. ◘

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DP shop uses FEPs to save, add applications

continued from page 13

attached to Unisys A15 mainframes and use A15-based Burroughs Corp. Poll Select software to poll each remote terminal.

In the event that one terminal on a multidrop line does not respond to a poll issued from the host and NSP, other terminals on that same line are prevented from communicating with the host until the faulty terminal is dropped from the polling list. Terminals are disconnected only after failing to respond to a polling request for a user-specified time.

Looking for LATA

With the new network, FIS will install the 20 CP2000 front-end processors at five remote locations to replace the NSPs at the host site, said Jerry Kruczek, FIS vice-president and manager of technical services.

Situating the CP2000s at remote locations will help FIS reduce mileage charges on its analog leased lines by confining each, for the most part, to a single local access and transport area.

"We won't be able to have a completely LATA-pure network," Kruczek said. "But we want to stay LATA-pure as much as possible as a way of reducing costs."

In addition, each CP2000 will run Unisys Network Control Facility software that enables the CP2000 to poll each remote terminal directly, thus off-loading this chore from the A15 hosts.

Terminals and microcomputers will be linked via 9.6K bit/sec analog leased lines to the nearest CP2000. Those CP2000s will be connected in a ring topology to other front-end processors at the data center via 56K bit/sec backbone leased lines supporting Unisys' Burroughs Data Link Control protocol. The ring topology provides an alternate path to the data center should one of the 56K bit/sec links fail.

By confining the terminal polling to remote CP2000s, FIS can devote more CPU cycles to processing applications, which is needed for the new applications, Kruczek said. Additionally, it will keep data flowing between the hosts and CP2000s by keeping polling signals off the 56K bit/sec backbone network links.

This differs from using a statistical or time-division multiplexer in the remote locations, according to Kruczek. "Unfortunately, if you had a statistical or time-division multiplexer, you'd still be doing the polling from the host," he said.

The network redesign also helped FIS avoid being hit with a 35% increase in leased-line costs after AT&T earlier this year began to phase out a special analog leased-line volume discount billing plan called Telpak.

Telpak

Telpak was a bulk-discount billing plan offered by AT&T before divestiture. Several states, including Florida, allowed the plan to remain in effect for a specified amount of time following the Bell System breakup.

The new network design will help FIS reduce its overall operations budget by roughly 10%, Kruczek said. "We feel that this new network will save us $2 million over five years." ◘

Data Packets

continued from page 13

four-wire leased or dial-up lines. Both modems also support Microcom, Inc.'s Microcom Network Protocol (MNP) error checking.

The VA9632E board resides in Racal-Vadic's VA1682 modem chassis. In addition to MNP error checking, the VA9632E supports MNP Class 5 data compression that enables the modem to achieve an effective throughput of 19.2K bit/sec under optimal line conditions.

The VA9624E board resides in Racal-Vadic's VA1604 chassis or its VA1680/81 chassis.

The VA9632E is priced at $1,695, while the VA9624E is priced at $1,195.

Wells Fargo & Co. last week said its Express Stop automated teller machine network has been reprogrammed to accept ATM cards that are part of the Plus System, Inc. nationwide ATM network.

In an announcement made at the Bank Administration Institute's Retail Delivery Systems Conference in New Orleans last week, Wells Fargo said the move gives holders of Plus ATM cards access to the more than 1,250 Wells Fargo-owned ATMs in California.

Multi-Tech Systems, Inc. recently introduced a V.32 modem that operates full-duplex at 9.6K bit/sec over four-wire leased lines as well as two-wire dial-up lines.

With this dual capability, the MultiModem V.32L can provide automatic dial backup for four-wire leased-line applications. It operates in both synchronous and asynchronous modes.

The switch from leased line to dial backup occurs after an attempt to reestablish a carrier signal has failed. During a user-specified time interval, the originating modem tries to reestablish the connection, with dial backup being initiated after that time interval expires.

Adherence to the CCITT V.32 standard means the MultiModem V.32L can communicate with other V.32 modems at either 9.6K bit/sec or its automatic fallback speed of 4.8K bit/sec.

It also complies with V.21 at 300 bit/sec, V.22 at 1,200 bit/sec and V.22bis at 2,400 bit/sec.

MultiModem V.32L supports error correction using the V.42 standard, data compression using Microcom, Inc.'s Microcom Network Protocol Class 5, callback security and remote configuration.

The modem is available now for $1,395. ◘

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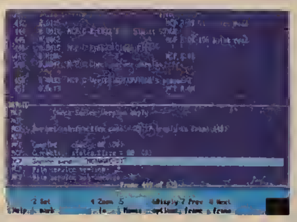

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Netnotes

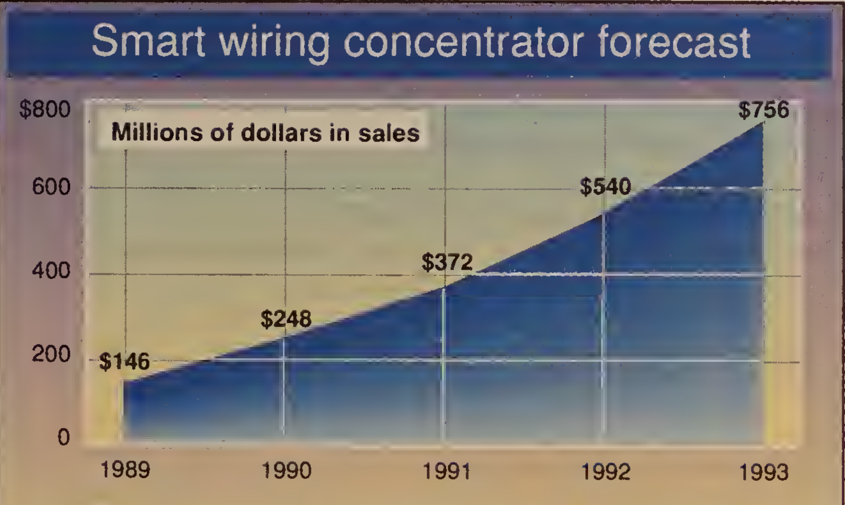
Icot Corp. of San Jose, Calif., has enhanced its OmniPath local-area network-to-mainframe gateway with memory-management software that reduces the amount of workstation memory required to support multiple 3270 emulation sessions.

When used with the new RAMiser enhancement, the OmniPath software takes up only 40K bytes of memory.

Available since Dec. 1, the RAMiser software is included in Icot's OmniPath product. Existing OmniPath users can obtain a free upgrade.

Pricing for the OmniPath line depends on configuration and ranges from $995 for a single-user 3270 connection to $7,995.

Tiara Computer Systems, Inc. last week selectively cut prices on its best selling Ethernet and Arcnet network adapters by an average of 25%. The company's original eight-bit Ethernet adapter, LanCard/E * PC 10000, now costs $299, down from $395. The price of the LanCard/A * AT , Tiara's most popular 16-bit Arcnet adapter, was reduced from $495 to $375. The prices on Tiara's other 16-bit Ethernet and Arcnet Micro Channel, AT and unshielded twisted-pair adapters remain unchanged.



U.S. sales of smart wiring hubs, which incorporate sophisticated network management capabilities, will rise 417% to $756 million by 1993.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

Smart wiring hubs offer LAN control

Users look to intelligent concentrators for net management, ability to support mix of wire.

By Laura DiDio
Senior Editor

CAMBRIDGE, Mass. — Large local-area network users are abandoning dumb wiring concentrators that lack net management capabilities in favor of intelligent wiring hubs that can be managed from a central location.

Smart hubs typically come with eight, 12 or 16 slots and accept interfaces for connections to workstations. The hubs are located in wiring closets and wired to offices in a star topology.

Features supported include sophisticated network management capabilities such as real-time network monitoring, control and statistical analysis. They can also be configured with internetwork bridges and routers.

> "Depending on configuration, smart hubs range in price from $4,000 to $50,000.
>
> ▲▲▲

Smart hubs — such as SynOptics Communications, Inc.'s System 3000 and Ungermann-Bass, Inc.'s Access/One — are capable of supporting multiple types of LANs, such as Ethernet and token ring and emerging 100M bit/sec Fiber Distributed Data Interface (FDDI).

Others, such as Proteon, Inc.'s Series 70 Intelligent Wire Center hub unit, supports just one type of LAN, which is token ring in Proteon's case. However, all of the smart hubs support multiple types of media, including shielded and unshielded twisted pair, coaxial and fiber-optic cabling.

Functionality aside, intelligent hubs are distinguished from dumb wiring concentrators because they have more components and require electrical power. By contrast, dumb hubs, such as IBM's Multi-Station Access Unit, are less expensive than intelligent hubs but lack the ability to report and monitor activities such as traffic, error conditions, faulty nodes or broken cables.

Depending on the vendor and the network configuration, smart hubs range in price from about $4,000 for an entry-level system supporting 10 users to about $50,000 for a fully configured system supporting 132 users on a single hub, analysts said.

The demand for the devices is most pronounced among large corporate and government LAN users whose networks are dispersed among different buildings or different floors within the same building, according to Jerry Eisen, managing director of consulting services at Goldstein, Golub & Kessler, a New York-based accounting firm.

A handful of companies currently market smart hubs, including Proteon, SynOptics, Ungermann-Bass, Cabletron Systems, Inc. and David Systems, Inc. But the booming popularity of the devices is attracting the attention of other heavyweights, according to Mary Modahl, an analyst at Forrester Research, Inc. in Cambridge, Mass. Digital Equipment Corp., AT&T, Hewlett-Packard Co. and 3Com Corp. are all readying smart hubs, she said.

The demand for these products is simple to identify, according to Eisen. "The larger and more dispersed the network, the

(continued on page 20)

Radiology institute builds imaging network with DEC

Net stores, distributes X-rays, CT, MRI images.

By Susan Breidenbach
West Coast Bureau Chief

ST. LOUIS — The Mallinckrodt Institute of Radiology and Digital Equipment Corp. have developed a way to store and distribute diagnostic images — X-rays, computed tomography (CT) and magnetic resonance imaging (MRI) — into a campus-wide DECnet Ethernet network.

The newly operational technology is the first piece of an automated radiology information system the institute and DEC are building that ultimately will deliver patient data to the desktop in the form of integrated text, voice and diagnostic images.

At the heart of the project is a Picture Archiving and Communications System (PACS) that will reside on a VAX minicomputer. PACS will store integrated text- and image-based patient data and display or distribute it on request.

"Our goal is to get patient information to physicians in real time so they can make better and more timely diagnostic and treatment decisions," said Dr. Gilbert Jost, Mallinckrodt's chief of diagnostic radiology.

Mallinckrodt, one of the largest and most highly regarded radiological centers in the world, performs more than 350,000 diagnostic examinations each year. Founded in 1930, the institute is part of the Washington University School of Medicine here.

> "Our goal is to get patient information to physicians in real time," Dr. Jost said.
>
> ▲▲▲

Mallinckrodt's Electronic Radiology Laboratory is now storing diagnostic images electronically on an archiving device controlled by a VAX. Once the PACS is completely in place, an image taken by an X-ray machine or other device at one site can be transmitted to and displayed on screens in physicians' offices

(continued on page 20)

Social Security to install 60 token rings nationwide

By Gail Runnoe
Washington Correspondent

BALTIMORE — The Social Security Administration will install more than 60 token-ring local-area nets at offices nationwide over the next few months to support administrative applications.

The General Services Administration awarded a $4.9 million contract to Network Management, Inc., based in Fairfax, Va., to design and install the nets and teach Social Security personnel how to use them. Installations have already begun on 13 networks at Social Security offices in the Baltimore, Philadelphia and Washington, D.C. areas, and the others nets are scheduled to be cut over by March 1990.

The GSA specified use of token-ring LANs because in-house studies showed the token-ring architecture would work best in the Social Security Administration's IBM Systems Network Architecture environment, said Herbert White, the agency's branch chief for office systems networks.

The token-ring LANs will run Novell, Inc.'s Advanced NetWare net operating system and support 80386-based network servers. The networks will also support an IBM 3270 gateway for access to the agency's IBM mainframes, a gateway for electronic mail access and an asynchronous communications gateway.

Each LAN will support 12 to 50 IBM-compatible workstations.

Andrew Snow, vice-president at Network Management, called the project "part of an office automation upgrade to improve productivity and ease communications between central office and field office locations."

White said the agency hopes to equip all of its more than 1,500 field offices with LANs eventually and connect the LANs over a wide-area network (WAN). "We're doing a feasibility study now for connecting these LANs with WANs," he said.

The network applications will generally be administrative — for instance, handling travel, payroll and personnel functions. "Within a building, there are a lot of old-fashioned office procedures," White said, adding that the agency still processes many of its time cards by hand.

Institute builds net with DEC

continued from page 19

around campus immediately.

This will greatly facilitate timely consultation and diagnosis, Jost said. "We plan to begin moving CT and MRI images out to physicians' offices in the hospital sometime within the next year."

Another item on the agenda for 1990 is migrating the institute's DECnet network from 10M bit/sec Ethernet to a 100M bit/sec fiber-optic local-area network based on the Fiber Distributed Data Interface (FDDI) specification. FDDI officially has 10 times the bandwidth of Ethernet but actually can provide about 20 times the throughput.

Mallinckrodt estimates FDDI will make it possible to transmit a CT study consisting of 35 images, or an MRI study made up of 65 images, across campus to a user's display in one or two seconds.

"We anticipate a relatively painless transition from DECnet/Ethernet to Digital's optical fiber network," Jost said. "We have held to the notion that we need networks that adhere to international standards, so this Digital pathway to FDDI is a natural one for us and one that will allow us to make a migration without software changes." ◻

Smart hubs offer LAN control

continued from page 19

more critical it is for users and [for] the network administrators who service the network to install smart wiring hubs," he said. "And since users are increasing the size of their nets, it's only natural that they'll want to perform sophisticated network management, bridging and routing functions from a central location."

Don Miller, SynOptics director of marketing, said, "Dumb hubs don't give users any type of high-level diagnostics for troubleshooting the net and determining where the problems are occurring and what the causes are."

Forrester's Modahl recently completed a report, called "Smart Wiring," that projects U.S. sales of smart hubs will soar 417%, from $146 million in 1989 to $756 million by 1993.

The sophisticated network management features and the ability to support enhancements such as 100M bit/sec FDDI bridges and multiprotocol routers are helping to make these devices more attractive to users, Modahl said.

"Smart wiring hubs make life much easier for users," Modahl said. "They give network administrators the ability to enable and disable individual nodes, and identify and locate trouble spots from their desktops. For the first time, administrators can manage their networks desk by desk."

Smart hubs can also reduce network downtime. "Smart hubs enable administrators to diagnose and service components on the network in minutes or hours," Eisen said. By contrast, dumb hubs require network administrators to guess what and where problems may be.

"Before the advent of smart hubs, users were forced to rely on dumb hubs distributed, in some cases, throughout several buildings," Eisen said. "The network administrators became network rabbits — literally running around the building or buildings trying to manually determine whether the problem was in the wiring closet, with the cabling or in an adapter in a user's workstation."

Intelligent hubs such as SynOptics' LattisNet 3000 Concentrator enable network managers to administer an enterprisewide network from their console, performing all the physical diagnostics that previously could only be done manually, Eisen said.

Any user who is doing a major network upgrade or installing a new network would be foolish not to buy intelligent hubs, Eisen said. "For the $20,000 to $40,000 price, smart hubs represent a onetime investment that significantly increases network uptime," Eisen said.

The only cautionary note sounded by analysts concerned the still evolving 10BaseT standard for 10M bit/sec Ethernet transmissions over unshielded twisted-pair wiring.

"Users who want to make a big investment on the Ethernet side for [unshielded twisted pair] should absolutely demand a 10BaseT-compliant warranty from their smart hub vendors," Eisen said. "Otherwise, they could be in for a very unpleasant surprise if the product they get today doesn't conform to the final 10BaseT standard." ◻

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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Worth Noting

"Many companies are still reluctant to try a new vendor or service for fear of being criticized. More adventurous companies generally have more self-confidence and a greater number of sophisticated technical people on board.

Arthur Solomon
Vice-president and director
Arthur D. Little, Inc.
Cambridge, Mass.

Association Watch

The **International Communications Association** is holding its 16th annual Winter Seminar Jan. 14 to 17 in Fort Lauderdale, Fla. The seminar, "Business Information Strategies: 2000," will focus on four topics: finance, business, technology, and research and development. It will feature presentations from communications users, educators, suppliers, consultants and business experts.

The conference will cost $595 for ICA members and $695 for nonmembers. For more information, call (800) 422-4636.

Washington University in St. Louis will hold a conference Jan. 17 to 19 to explore issues of service and quality in the use of information systems. The conference, "Linking Service and Quality Measures to Excellence in Business Performance," will feature presentations from information systems managers from such companies as IBM, Federal Express Corp., CSX Technology, as well as consultants and academics. There will also be two separate half-day workshops on Jan. 18 and 19. The conference costs $695, and the workshops cost $300. For more information, call (314) 889-4556. ◪

Kendall staffers bail out, start consulting business

Company backs formation of the fledgling firm.

By Wayne Eckerson
Senior Writer

MANSFIELD, Mass. — Nine members of Kendall Co.'s corporate information technology department have left the company to form a consulting firm that will aid users in networking IBM Application System/400s.

The venture was prompted in part by a downsizing plan that would have eliminated about half the jobs in Kendall's corporate information systems (IS) department.

Kendall went private in a leveraged buyout late last year and was required to cut costs.

The new consulting company, KenTech Systems, Inc., based here, was formed with blessings from Kendall's top management, which handed KenTech Systems a yearlong contract to manage the health care product manufacturer's nationwide AS/400 network.

That contract was a win-win situation for both Kendall and the KenTech founding members, according to Jeffrey Witzburg, Kendall's former director of information technology and now KenTech's vice-president and chief operating officer.

Kendall needed to reduce its overhead, and the information technology group was eager to move on to new challenges. Last year, the group replaced an aging mainframe-based IS with a distributed AS/400 network linking about 20 of Kendall's operating divisions.

The AS/400 network made it possible for Kendall to consider paring its IS staff, Witzburg said. Kendall gave the go-ahead about three years ago to build the AS/400 network to support a decentralization plan designed to make the firm's scattered operating divisions run as autonomous business units.

Under the plan, the business units would also assume primary responsibility for MIS, leaving corporate IS in a scaled-back supporting role.

With processing now handled independently by each operating unit, Kendall could no longer justify retaining a full IS group, especially after the leveraged buyout put a tight lid on expenditures.

(continued on page 22)

BOOK REVIEW

BY ERIC SCHMALL

Authors simplify the world of LANs

Local Area Networks: Architectures and Implementations, James Martin and Kathleen Chapman (Englewood Cliffs, N.J: Prentice Hall, 1989), $40.

Veteran data communications authors James Martin and Kathleen Chapman have written a comprehensive and easy-to-read book about local-area networks that is suitable for readers with a broad range of technical expertise.

For the neophyte, *Local-Area Networks: Architectures and Implementations* offers a nonthreatening introduction to the world of LANs. For the person familiar with the basics of LAN technology, the book offers illuminating explanations about such things as IEEE 802 standards. For experienced data analysts, it explains the differences between vendor approaches in such areas as routing logic and address formats.

The authors carefully and logically take readers through the inner workings of LANs. Tackling the easiest topics first, the authors begin by describing a LAN's physical connections. They discuss various network access methods and then plunge into the thicket of IEEE 802 standards, providing readers with a careful and comprehensive analysis. Subsequently, the authors explain related subjects such as Fiber Distributed Data Interface, data private branch exchanges and interconnection of LANs.

The balance of the book evaluates LAN offerings from major vendors, including Allen-Bradley Co., Apple Computer, Inc.,

(continued on page 22)

Schmall is the network systems manager for an insurance holding company.

MANAGEMENT PROFILE

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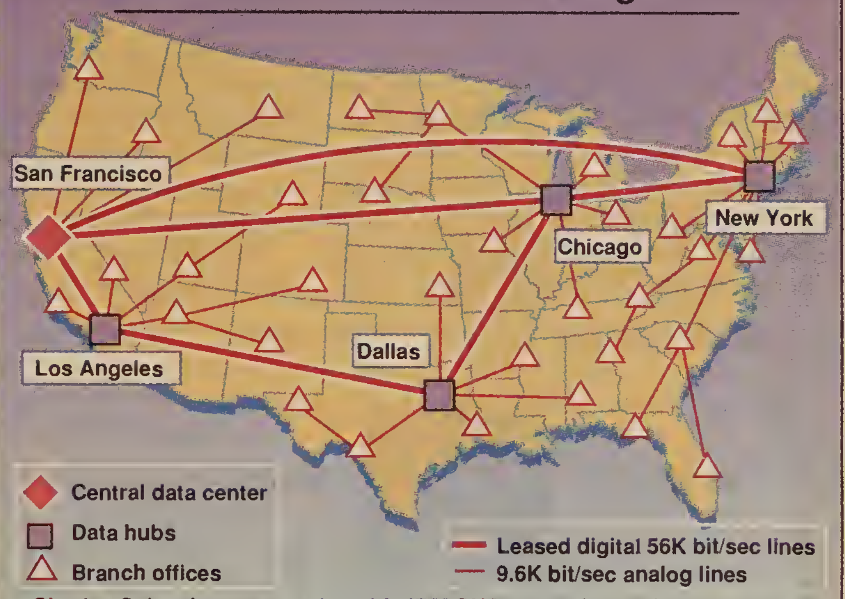
BY WAYNE ECKERSON

Charles Schwab's brokerage net



Charles Schwab uses a nationwide IBM SNA network to submit customer orders from its 110 branch offices to most major exchanges and over-the-counter dealers.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: CHARLES SCHWAB & CO., INC., SAN FRANCISCO

Net helps Schwab meet client needs

SAN FRANCISCO — For discount broker Charles Schwab & Co., Inc., networking is the key to staying ahead of the competition.

Charles Schwab relies heavily on voice and data networking to support a range of discount brokerage services. These services enable Charles Schwab customers to place orders for stocks, bonds, options and mutual funds any time of the day from their home or office using a phone or personal computer.

"We are a 24-hour-a-day, seven-day-a-week operation that tries to maximize the number of avenues by which customers can reach us," said Richard Chew, senior vice-president in charge of telecommunications at Charles Schwab's headquarters here.

Charles Schwab boasts a nationwide data network that links 110 branch offices to most major U.S. exchanges, over-the-counter stock dealers and market information sources, such as the Dow Jones News Retrieval Service.

The IBM Systems Network Architecture network enables brokers at the branch offices to execute stock orders on-line and access customer account status, as well as information about stocks and companies listed on the exchanges, Chew said. The network also supports a proprietary electronic mail service that lets Charles Schwab brokers exchange information.

Each branch office is linked via 9.6K bit/sec leased lines to one of five regional hubs. The hubs are located in New York, Chicago, Los Angeles, Dallas and San Francisco.

These hubs house IBM 3725 front-end processors that pass information via 56K bit/sec leased lines to an IBM 3090 mainframe in Charles Schwab's central data center here. The mainframe routes traffic to other sites on the network or to outside exchanges, dealers and other brokerage-related companies via 56K bit/sec links.

The network also provides access to two value-added networks, which Charles Schwab customers can access to enter orders using personal computers.

Charles Schwab offers a proprietary software product, called Equalizer, that enables personal computer users to enter orders via Tymnet's value-added network. Tymnet routs customer orders on-line to the mainframe in Charles Schwab's central data center, which then sends each order to the appropriate exchange for execution.

Another service enables personal computer users to enter orders using any brokerage software. Introduced in September, the service lets customers transmit their orders to General Electric Co.'s GEnie net. GEnie then delivers the orders to Charles Schwab's mainframe here.

The brokerage also offers customers a variety of phone-in services.

Using AT&T 800 numbers, customers can place orders after regular business hours. These calls come into a Charles Schwab calling center here, where brokers take orders and enter them into the data network.

(continued on page 22)

Net helps Schwab meet client needs

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Charles Schwab offers a voice response service, called Telebroker, which allows customers to enter orders and get account and market information using the keypad of a push-button phone. AT&T, which manages the voice response equipment out of two of its service centers, transmits customer requests or orders via leased lines to Charles Schwab's mainframe here.

The company has also committed significant resources to ensure that its branches can handle peak periods of investment activity. After the 1987 crash, Charles Schwab built an overflow calling center here that handles backed-up calls from branch offices. Charles Schwab uses call-forwarding services offered by local exchange carriers to route overflow calls to its backup calling center.

The calling center, which now handles overflow calls from about 20% of the branches, enabled Charles Schwab to field customer calls without delay during October's 190-point market decline.

The brokerage is in the midst of building a new calling center in Indianapolis to support nationwide 800 call-in service. This center, along with several others in the works, will enhance Charles Schwab's ability to field customer calls during peak periods of market activity. It also gives Charles Schwab sufficient backup in case any of the central calling centers are knocked out and can't accept calls.

According to Chew, Charles Schwab plans to upgrade its network to make it easier to link up with value-added networks and other companies in the brokerage business. This would let Charles Schwab offer customers a wider range of options for entering orders electronically, something customers are increasingly demanding. Chew said the company is exploring ways to make the network more open and flexible.

Currently, the brokerage has to build expensive custom interfaces to connect to other networks. Charles Schwab has had to shut down its entire SNA network to make major changes.

"There's a growing trend among securities firms to exchange information electronically instead of by paper," Chew said. "It will be critical for us to continue to build electronic links to other companies' networks to succeed in the future." ◼

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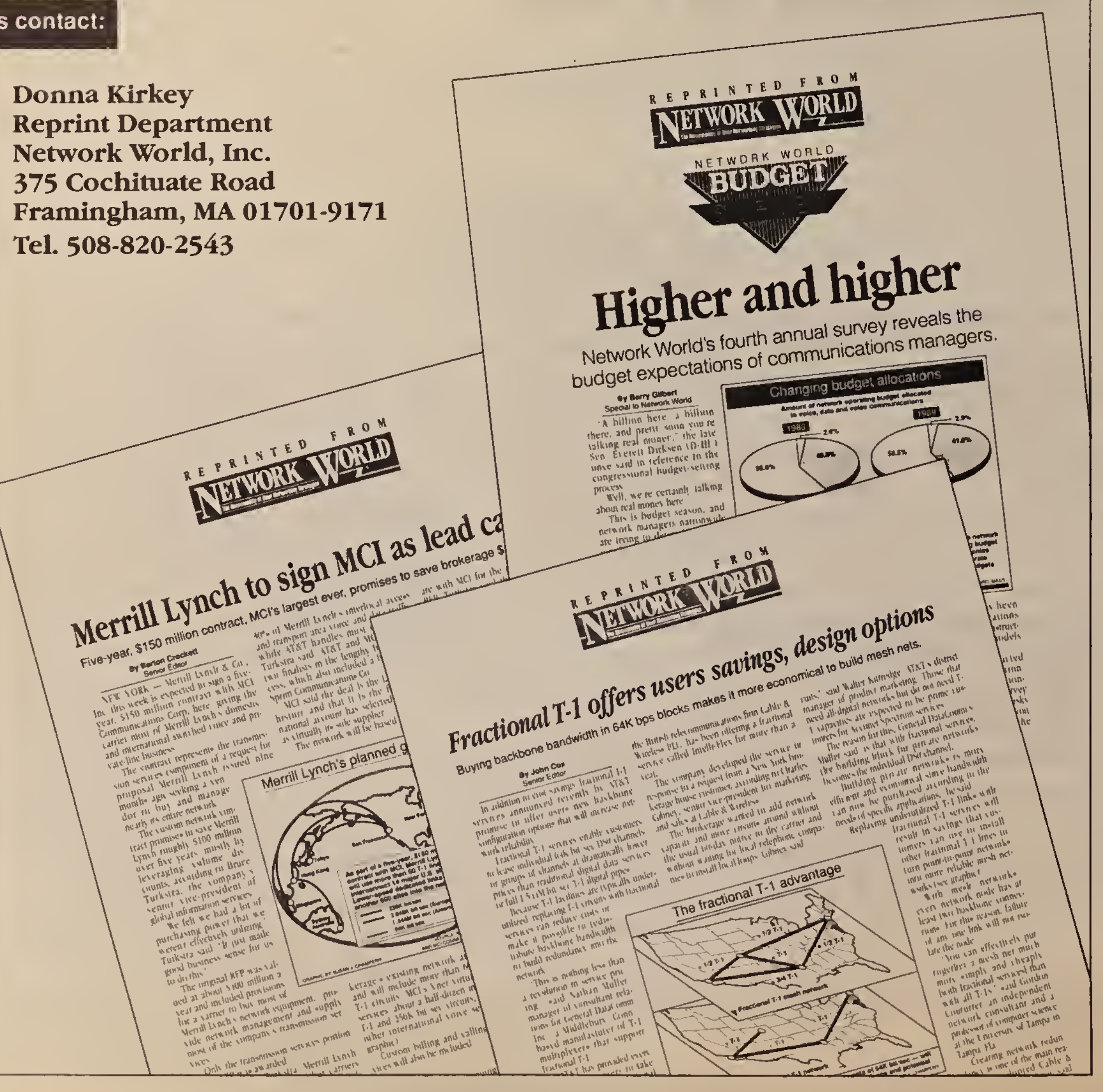
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Fractional T-1 offers users savings, design options
Buying backbone bandwidth in 64K bps blocks makes it more economical to build mesh nets.
The fractional T-1 advantage

Kendall staffers start consulting business

continued from page 21

"To some extent, we networked ourselves out of a job," Witzburg said.

Seeing the writing on the wall, Ron Cipolla, Kendall's corporate director of IS and now KenTech's president and chief executive officer, pitched a deal to Kendall's top management. He proposed that Kendall make the IS group an independent profit center that could market its AS/400 expertise to outside companies.

This plan would enable Kendall to retain the department and its AS/400 expertise without losing money. According to Witzburg, members of the corporate systems group had become so specialized that if one was laid off, the others wouldn't have the knowledge or experience to cover that person's area.

While management was receptive to the idea, restrictions in the terms of the leveraged buyout prevented Kendall from entering new lines of business and management nixed the plan, Witzburg said.

Cipolla then launched the idea for KenTech. He proposed that Kendall allow members of the corporate systems group to form an independent consulting company that would provide Kendall with IS planning and technical services. The new company would charge less than what Kendall would otherwise pay in salary to the members of the new consulting firm.

Ambitious for the future

KenTech plans to spend the first year of its contract with Kendall migrating the firm's private AS/400 network onto IBM's Information Network (IIN), a project that KenTech members had begun while still at Kendall, Witzburg said. IIN, which is IBM's value-added network offering, will replace the leased lines Kendall now uses to connect its AS/400s.

Meanwhile, KenTech is busy drumming up outside clients. The firm offers complete AS/400 consulting services to companies that want to upgrade from IBM System/36s to AS/400s or downsize from mainframe systems to AS/400s.

In addition, KenTech offers technical planning and support to companies that don't want to retain a full-time AS/400 technical specialist. For a fixed annual fee, KenTech will perform site and capacity planning, software installation, system configuration and disaster recovery planning, among other things. ◼

Authors simplify the world of LANs

continued from page 21

AT&T, IBM, Novell, Inc. and 3Com Corp. The evaluations include discussions of how the products adhere to 802 standards.

The book's strength is in the way it communicates complex ideas in simple, easy-to-understand prose. The book also effectively uses illustrations to clarify complicated LAN concepts.

The book could be improved, however, by the addition of a glossary and bibliography. The only reference for further reading is a tear sheet for ordering more James Martin books. Nevertheless, the authors successfully untangle the alphabet soup that makes up so much of the discussion of LAN technology — NETBIOS, APPC, TCP/IP, MAP/TOP. As an introductory text or a reliable reference, this volume has a place in the telecommunications manager's library. ◼

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

Worth Noting

See inside for:

- Brooktrout's fax system allows users with push-button phones to retrieve product information.
- Emulex Corp. unveils server that ties terminals to TCP/IP networks.

First Look

Develcon system to link remote Ethernets

Develcon Electronics, Ltd. recently introduced a local-area network bridging system that can link Ethernets over wide-area links at speeds ranging from 9.6K bit/sec to 1.544M bit/sec T-1 and across campus environments at 100M bit/sec.

The **Model 7183 Ethernet Bridging System** consists of a chassis that accommodates as many as 32 bridge interfaces, each of which connects to a single LAN, as well as transfer cards that link the bridges over telecommunications lines to remote Ethernets.

Initially, the company is offering two chassis models: the 5010 Series, which supports up to 10 cards, and the 5032 Series, which supports up to 32 cards.

Each bridge attaches directly to a single Ethernet and supports virtual connections to other 7183 bridges. The bridges provide data-link level transport for all Ethernet-compatible protocols, including Open Systems Interconnection, Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s NetWare, as well as Microsoft Corp. and 3Com Corp.'s OS/2 LAN Manager.

They are independent of all upper-layer protocols. In campus environments, the 100M bit/sec connections are compatible with the Fiber Distributed Data Interface specification at the physical layer only.

The Ethernet bridge cards have a filtering rate of 11,000 packet/sec and a transfer rate

(continued on page 26)

Board links PC to public net services

By Tom Smith
New Products Editor

PORTSMOUTH, R.I. — Promptus Communications, Inc. recently unveiled an interface that connects IBM Personal Computer ATs and Extended Industry Standard Architecture (EISA) microcomputers to T-1 and slower speed transmission services.

Promptus I is a 16-bit interface that gives personal computer users access to switched 56K bit/sec, fractional T-1, T-1, European T-1 or Integrated Services Digital Network Primary Rate Interface (PRI) lines, and it supports connection to a single T-1 line.

Through connection to a T-1 trunk, a workstation can perform high-speed file transfers, bandwidth-intensive image transfers and other high-volume data applications at full T-1 speeds, according to Al Lucci, president of Promptus. This gives users a speed and performance advantage over typical wide-area network connections, such as bridges or analog modems, the company said.

Promptus expects users, OEMs and systems integrators to develop applications.

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Promptus I comes in three versions: a board with an integrated data service unit/channel service unit (DSU/CSU); a T-1 interface lacking CSU functionality and, therefore, the ability to connect directly to a T-1 circuit; and a European T-1 interface (2.048M bit/sec) that also lacks CSU functionality. The latter two versions require use of a T-1 or T-3 multiplexer for connection to the public network.

The interface comes bundled with a single software application: file transfer that supports transmission speeds up to 1.544M bit/sec T-1 rates.

Promptus expects users, OEMs and systems integrators to develop applications, such as those utilizing PRI, but Lucci said the company envisions it being used in a variety of environments, including with LAN bridges, to optimize performance. Bundled with the product is a software developers' tool kit written in the C programming language.

In a LAN bridging configuration, the bridge would be linked to the Promptus I module, which would provide access to a T-1 trunk. "Most LANs today are connected at 56K bit/sec or slower by means of analog modems," Lucci said.

Working in conjunction with a LAN bridge, Promptus I would perform T-1 framing; it would interface to the T-1 trunk with its optional integrated DSU/CSU functionality.

Another ideal application for Promptus I would be transmission of high-resolution graphics, Lucci said. With a T-1 attachment, users will dramatically reduce the time required to transmit a screen of image data, which can often translate into 1M byte.

Transmission of X-rays, for example, wasn't previously practical with analog modems but is now feasible, he added.

Lucci claimed that personal computer support for PRI makes Promptus I the first product of its kind. The PRI divides the capacity of a T-1 line into 23 64K bit/sec carrier channels and one 64K bit/sec signaling channel.

An on-board Intel Corp. 80C186 coprocessor relieves the Personal Computer AT or EISA host of the overhead associated with communications protocols. The interface supports high-speed, synchronous protocols such as X.25, Link Access Procedure (LAP) B and LAP D.

Promptus I uses a shared memory system that speeds host processor-to-coprocessor communications by allowing all messages created in host memory to be created simultaneously at the coprocessor. This allows higher throughput than direct memory access, which requires a message to be physically transferred from the host to coprocessor, absorbing memory cycles.

The product supports D4 and extended superframe format (ESF) framing and also accepts 4K bit/sec in data from ESF's management channel. It has an RS-232 port for logging alarms, such as ESF errors or red and yellow outage alarms on a terminal or printer.

The initial release of Promptus I, which will not include PRI support, is expected to be available in January 1990. Volume shipments with PRI support will begin in late February.

Promptus I, with an integrated DSU/CSU, costs $3,290; with a T-1 interface, $2,190; and with a European T-1 interface, $2,190.

Versions with software supporting the PRI will cost extra, but the company has not yet released that pricing.

Promptus can be reached by writing to Portsmouth Business Park, Portsmouth, R.I. 02871, or by calling (401) 683-6100.

Harris offers hotel package for its PBX

The Accommodator tracks check-in, checkout, and disables phones to prevent employee abuse.

By Tom Smith
New Products Editor

NOVATO, Calif. — Harris Corp.'s Digital Telephone Systems Division recently introduced the Accommodator, a hotel package for its 20-20 digital private branch exchange.

Accommodator functions can be accessed from an ASCII terminal or through an optional interface from personal computer-based property management systems that control functions ranging from room status to lighting systems.

The company recommends that the Accommodator be used in conjunction with 20-20 models that have between 240 and 1,920 ports.

The Accommodator can be used to record and maintain information about everyday hospitality functions, such as check-in, checkout and room status. It can also be used to handle automatic wake-up requests and to disable telephones.

The last feature will enable hotel operators to deactivate long-distance calling capabilities by room to prevent phone system abuse by hotel personnel.

The Accommodater automates provision of wake-up calls by enabling hotel personnel to key in a wake-up time for a room extension. When the switch initiates the call the next day, it passes the call to an optional recorder, which plays a prerecorded wake-up greeting.

The Accommodator can be used to maintain information about everyday functions.

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Another hardware component of the product is an audit printer,

(continued on page 26)

Nynex adds LAN fax pack for OS/2-based servers

WHITE PLAINS, N.Y. — Nynex Information Solutions Group recently introduced a local-area network facsimile system that enables DOS-based workstations to send and receive faxes through OS/2-based servers.

The product, Nynex LANpath Fax Server, consists of an interface board manufactured by GammaLink, Inc. of Palo Alto, Calif., and Nynex software that runs on the dedicated fax server. Another software component, which provides fax services to client workstations attached to a file server, is installed directly on the nodes or on a LAN file server.

The interface board runs on an IBM Personal Computer and supports LANs that are Network Basic I/O System-compatible, including Novell, Inc.'s NetWare and 3Com Corp.'s 3+Open.

Each card supports a single phone line, but users can transmit multiple faxes simultaneously by populating the personal computer with more than one fax card.

Nynex LANpath Fax Server is the only LAN fax product designed specifically to take advantage of OS/2's ability to run multiple sessions concurrently, according to John Kaiser, product manager for Nynex LANpath.

Personal computer users send fax documents by entering information at their keyboard such as file name or names to be included, as well as the recipient's name and fax number.

Users can broadcast documents by addressing them to a list name, which includes an unlimited number of recipient names and fax numbers.

Cover sheets can be automatically addressed if the recipient is in the user's personal phone book.

Information about the document sender is derived from the user's identification and inserted into the cover sheet.

For faxes received, the system administrator can program the LANpath system to automatically output all documents to an attached printer, Kaiser explained. Alternatively, all incoming faxes can go to a spool queue and be written to a hard disk.

From there, an administrator

(continued on page 26)

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The least a local area network can give you is time for lunch.

Some food for thought.

Getting all the information from all your equipment to all your people can occupy all your time.

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It's another reason why no other company connects more companies with more equipment to more people than IBM.

For more information on IBM local area network solutions, contact your local IBM Advanced Product Dealer or your IBM marketing representative.

We can help your entire organization run more smoothly and productively. And that means you can devote your time to other important matters.

Bon appétit.

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First Look

continued from page 23

of 4,000 packet/sec.

Transfer cards automatically route data over the most efficient links based on operator-defined costs.

Flexible mesh topologies, redundant and load-sharing links, as well as dynamic alternate routing are supported.

The 7183 Ethernet Bridging System is available 30 days after receipt of order. Prices start at $12,000 to $15,000 for a 5010 Series chassis, a single bridge card and a single transfer card.

Develcon Electronics, Ltd., 515 Consumers Road, Suite 500, Willowdale, Ont., Canada M2J 4Z2; (416) 495-8666.

Server ties terminals to TCP/IP networks

Emulex Corp. recently introduced a Transmission Control Protocol/Internet Protocol terminal server that connects asynchronous terminals to an Ethernet network.

Performance 4008-T supports up to eight terminals running simultaneously at speeds up to 38.4K bit/sec.

The company said this makes it well-suited for handling graphics terminals and high-speed serial printers.

The terminal server is compatible with TCP, Address Resolution Protocol, User Datagram Protocol and Telnet.

P4008-T can be used with TCP/IP gateways and name servers, which allow users to create simple names for devices with which they communicate.

It also has a TCP mode to allow users to bypass the Telnet protocol when making a connection.

A plug-in PerformancePak feature allows a user to upgrade the unit easily when features such as new protocols become available.

For flexibility, the Performance 4008-T operating software can be downline loaded from any TCP/IP, Digital Equipment Corp. VAX/VMS or DEC Ultrix system on the network.

This allows the user to update all servers easily whenever any new releases of the software become commercially available.

The product is available 30 to 60 days after receipt of order for $2,495.

Emulex Corp., 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, Calif. 92626; (714) 662-5600.

Fujitsu DSU supports fractional T-1, DDS

Fujitsu America, Inc. recently introduced a digital service unit (DSU) that supports clear channel 64K bit/sec fractional T-1, AT&T's Dataphone Digital Service 1, Dataphone Digital Service 2 and compatible offerings from other carriers.

The **Fujitsu DSU** has two ports: an RS-232 supporting transmission speeds ranging from 2,400 to 19.2K bit/sec and a V.35 that will support 56K and 64K bit/sec transmission.

Dataphone Digital Service 1 provides a customer data channel at speeds ranging from 2,400 to 56K bit/sec.

Dataphone Digital Service 2 performs the identical function but also gives users an 8K secondary channel of signaling and diagnostic information.

The DSU does not multiplex the T-1 channel if the user employs 64K bit/sec fractional T-1 services. The splitting of the T-1 trunk must take place at the carrier's central office.

A front-panel LED display on the Fujitsu DSU informs users of the line and interface status. In addition, the LED display can be used to invoke test mode, under which loop-back tests can be performed.

The Fujitsu DSU is available now for $750.

Fujitsu America, Inc., 3055 Orchard Drive, San Jose, Calif. 95134; (408) 432-1300.

Modem supports plastic fiber-optic connections

Greenwich Instruments USA recently introduced an optical modem that converts digital signals to light for transmission over plastic fiber cables, overcoming the 50-ft. transmission barrier on RS-232 wire.

The **G0232 Fiber Optic Modem** attaches to the RS-232 port of a personal computer and a plastic fiber cable, which can link to another device over distances of up to 100 meters, or 273 feet.

The plastic fiber terminates in another G0232 modem attached to another personal computer, a printer or a local-area network.

Inside the device, which is about half the size of a cigarette pack, is an application-specific integrated circuit (ASIC) that converts the incoming digital signal into light pulses for transmission over the plastic fiber cable. At the receiving end, the ASIC performs the light-to-digital conversion.

The full-duplex modem operates in synchronous or asynchronous mode at speeds ranging from 300K bit/sec to 19.2K bit/sec.

Connection to the plastic fiber can be made by using an ordinary knife to cut the fiber and attach it to a locking screw that holds it in place. The modem offers users the benefits of fiber, namely immunity to electromagnetic interference and increased data security because there are no emanations from the cable.

G0232 is available now for $65.

Greenwich Instruments USA, 3401 Monroe Road, Charlotte, N.C. 28205; (704) 376-1021.

Wellfleet offers router/bridge for small sites

Wellfleet Communications, Inc. recently released a low-end multiple-protocol router/bridge product aimed at small sites.

The Wellfleet Feeder Node supports both LAN-to-LAN and WAN-to-WAN communications, and provides a maximum of two local-area network and two wide-area network connections. It offers a bridge performance of 11,700 frames per second and Internet Protocol packet forwarding of 7,200 packets per second.

A Feeder node with one Ethernet and one T-1 connection is priced at $8,995, and a model with two of each costs $9,995.

Wellfleet Communications, Inc., 12 DeAngelo Drive, Bedford, Mass. 01730; (617) 275-2400.

Harris offers hotel pack for PBX

continued from page 23

which is used to make hard copies of audit trails containing call record information, such as the number called, time and date, hotel phone numbers and guest rooms. The Accommodater makes it possible to update a guest directory that can be accessed by an ASCII terminal as guests check in and check out.

In addition to the attendant having access to this directory, the guest's name and room number is displayed on Harris' Optic Teleset display phones, enabling hotel staff members to address guests by name when they call to request service or information.

The Accommodator's message-waiting notification function will work with analog single-line telephones or Optic Teleset phones. The latter have RS-232 ports so guests with portable computers can transmit data through the switch.

Another option available with the Accommodator is Harris' automatic call distributor (ACD), which can serve a maximum of 128 agents and does not limit the number of trunks dedicated to the ACD function.

The cost of the Accommodater varies according to configuration, but a turnkey system designed to accommodate 300 users will cost less than $100,000, the company said. Pricing for the optional digital recorder and ACD functions has not been determined.

Harris' Digital Telephone Systems Division can be reached in writing at P.O. Box 1188, Novato, Calif. 94948, or call (415) 382-5000.

Brooktrout fax operates via push-button phone

By Tom Smith
New Products Editor

WELLESLEY HILLS, Mass. — Brooktrout Technology, Inc. last week introduced an integrated computer facsimile and voice response system that retrieves and transmits stored documents via fax in response to user requests entered into a push-button telephone.

The product is targeted at users who have a high degree of phone requests for information about their products or services. FlashFAX is positioned as an automated attendant for incoming callers, who simply key in the appropriate response to obtain a fax transmission of a product announcement, brochure, specification sheet or other type of company literature.

The product, FlashFAX, is a stand-alone unit based on an Intel Corp. 80286 microprocessor. It comes with three telephone jacks: one for voice input, one for fax output and one for diagnostics.

The system also comes with a 20M-byte hard disk, Brooktrout TR-111M facsimile card, Brooktrout TR-100M3 voice-processing card, a 1,200 bit/sec asynchronous modem, and integrated facsimile and voice-processing application software.

Callers hear a greeting and a list of documents from which to choose. They then select a document via keystrokes on the push-button phone. After making a selection, callers are prompted to enter a fax phone number. The documents are then automatically faxed to that machine.

The system administrator is guided by voice prompts in the voice response system to record a system greeting and a document list using a push-button phone.

> The product is targeted at users who make many phone requests for information.

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To assure system security, access to system management facilities requires entry of a password. To minimize downtime, FlashFAX includes a remote diagnostic capability that allows Brooktrout or dealer service personnel to diagnose problems over the phone.

FlashFAX is available immediately for $5,995.

Brooktrout can be reached in writing at 110 Cedar St., Wellesley Hills, Mass. 02181; (617) 235-3026.

Nynex adds LAN fax package

continued from page 23

with a password that provides access to incoming faxes assigns IDs to the documents so the proper recipients can access them. Individual users can display a listing of received documents that have not yet been assigned a user ID; users cannot, however, read those documents.

Users can view, print, delete or download any faxes to which their personal user ID has been assigned.

Users do not receive automatic notification of faxes sent to them. They must request a directory of the spool queue to find out if they have any documents waiting, Kaiser said.

A load-balancing feature built into the software determines which fax card can process a fax request the soonest and routes the request to that card. The feature can balance fax loads on nets with multiple servers outfitted with their own fax cards or a single server with several fax cards.

"We're thinking in terms of a corporate headquarters or an environment where faxing is extremely demanding and availability is critical," Kaiser said.

Nynex's LANpath Fax Server card has a 10-MHz Intel Corp. 80188 microprocessor with 256K read-only memory. It transmits documents over 9.6K bit/sec lines and is compatible with all Group III fax machines. Nynex LANpath Fax Server transparently converts most application file formats, including ASCII and Tag Image File Format, to the format used by the receiving fax.

An integrated accounting data base will inform users of activity occurring on a given server for usage analysis. The system administrator can request a report, which lists activity during a user-specified period. This activity includes fax numbers to which documents were sent, number of pages in each document, as well as time and date sent. The information can be displayed on a LAN workstation or printed out.

Similarly, a remote server management capability can be initiated from a LAN node. This allows a user at any node on the LAN to log onto the fax server and perform real-time control, diagnostics and changes to configuration parameters.

The product is expected to be available in January 1990 for $3,295.

Nynex Information Solutions Group can be reached in writing at 4 W. Red Oak Lane, White Plains, N.Y. 10604, or call (800) 526-7284.

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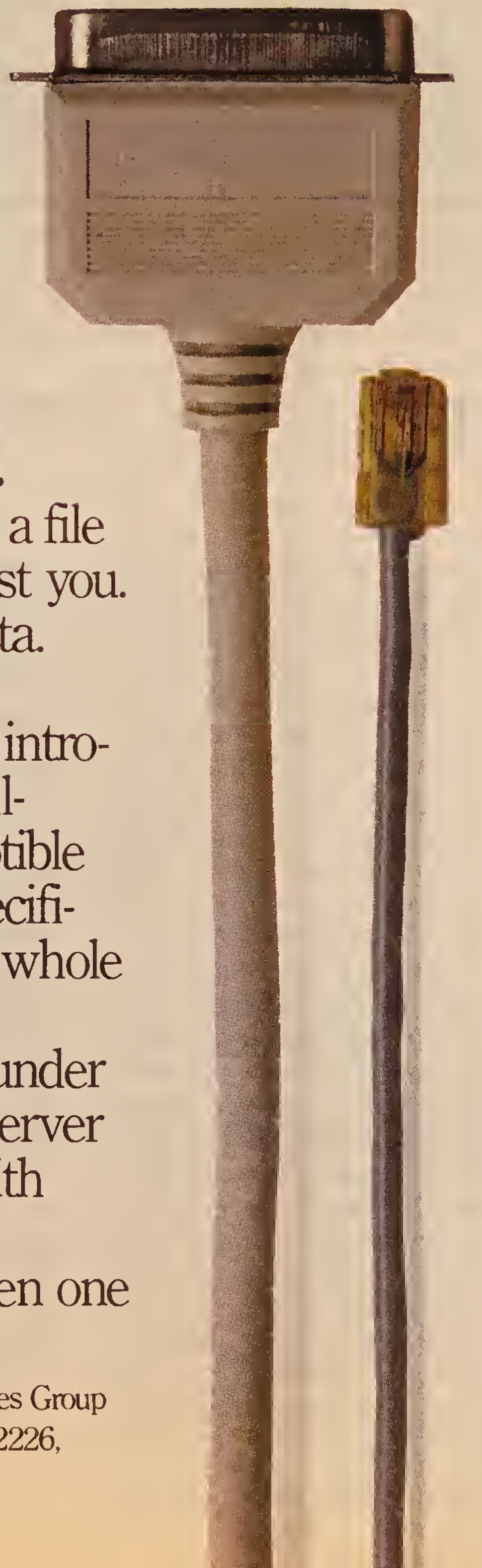

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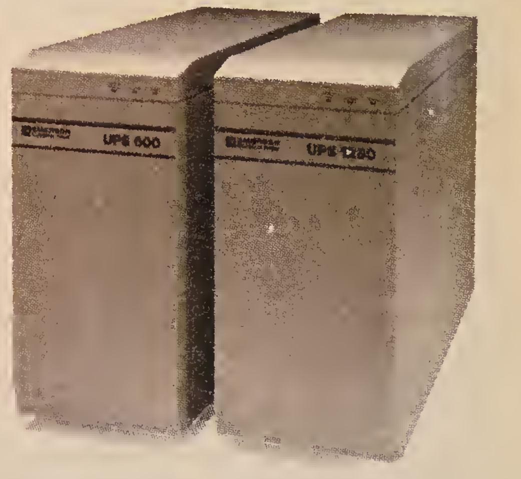

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See the FAXNeT Form on Page #63

OPINIONS

OSI PLANNING

BY JOHN MCQUILLAN

‘Wait and see’ approach to OSI is unwise for users

The arrival of Open Systems Interconnection products brings with it a number of planning questions, the most fundamental of which is this: Should you switch to OSI now, or should you wait and see what the future will bring?

Many organizations that choose the former alternative, notably government agencies and European companies, have decided to change to OSI as a matter of policy. Some have even decided to replace working computer and communications systems with new OSI-compliant products and services.

While there may be many reasons for making a total switch to OSI now, organizations doing so are in the minority. Most companies are reluctant to exchange one working system for another unless it offers a dramatic improvement in price or functionality, which is usually not the case with OSI.

> Nevertheless, some organizations will undertake a forced march to OSI.
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The reluctance of the U.S. military establishment to shift from Transmission Control Protocol/Internet Protocol to OSI is a case in point. Nevertheless, some organizations will undertake a forced march to OSI.

At the other end of the spectrum are companies that take a passive approach to OSI. They have noticed that many major vendors plan to introduce OSI support in their next generation of products. These companies reason that they can migrate to an all-OSI environment by simply replacing their computer systems, at the end of their useful lives, with OSI products.

Of course, this means delaying the transition to OSI for many years. In a big company, the replacement cycle for all computers and application software may take five to 10 years. Thus, this second strategy of wait and see may translate into waiting until 1995 or later.

There is also a third possibility. Some companies are actively exploring OSI and proactively selecting computers, as well as application and communications software, on the basis of OSI compatibility. They are neither making a total shift to OSI nor treating it as a passive migration. This middle-of-the-road strategy accelerates the migration by actively choosing OSI capabilities, rather than proprietary solutions, based on the customer’s own buying considerations.

What are some of the buying considerations that favor OSI? Many customers look forward to OSI as a way to eliminate network complexity. With a simpler network that has fewer protocols, they expect to be able to design, manage and operate their networks with fewer telecommunications personnel and less expenditure for network management equipment.

Other customers point to savings in conversion equipment and in related software, which today represents a source of frustration to many companies. Not only do they have to buy gateways linking one incompatible system to another, but they then have to keep such converters adequately maintained as the two or more end systems continue to evolve over time.

If your organization isn’t about to make a policy decision to migrate to OSI, you are not alone. But is it enough just to adopt the wait-and-see approach? Is it sufficient to wait until the second half of the 1990s to enjoy the full benefits of OSI?

Each year, more companies are finding that the answer to this question is no. They are also learning that they must take a proactive role and turn their attention to some of the future applications that will deliver on the promise of OSI.

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning communications systems.

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EDITORIAL

By studying the issues, Sikes’ FCC is off to a good start

Like Eastern Europe, the telecommunications industry in this country is experiencing a political thaw.

During the tenure of the last two Federal Communications Commission chairmen, some users, vendors and congressmen thought the agency was basing its decisions on political ideology rather than careful consideration of all sides of an issue. But several recent FCC rulings should give users hope that in the future, the agency will act less as a political advocate and more as an impartial regulator.

Late last month, the FCC unanimously voted to disallow strategic pricing of special access services and return to cost-based charges. This issue has been festering since 1985, when the regional Bell holding companies filed tariffs for special access that users believed were priced well above cost. The local carriers justified these charges as a tool to stem a mass exodus of large corporate users from the public switched network.

Despite a bitter outcry from users groups and carriers that the FCC was ignoring its own tariff rules by allowing carriers to set prices to achieve marketplace objectives rather than recover the cost of providing service, the agency was unyielding.

But last month, the FCC, under the direction of Chairman Alfred Sikes, ruled that strategic pricing had been a disservice to users by inflating private-line rates. The agency ordered refunds that could add up to $75 million. Although FCC staff members took particular pains to explain the reversal as a change in the marketplace rather than an admission that previous commissions had erred, Sikes sent a clear message to the industry that he’s not afraid to undo past decisions.

> These actions indicate that Sikes is willing to call a temporary time-out to give everyone a hearing on controversial issues.
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Sikes also seemed to back off of his predecessor’s gusto for customer-specific network deals when the FCC ruled on Tariffs 12 and 15 in October. Although the agency refused to prohibit AT&T from continuing to offer deals under these tariffs, it didn’t rule that these arrangements are legal, either.

And in the case of Tariff 12, insiders say that the chairman supported restrictions that would limit AT&T’s freewheeling marketing of the deals. These restrictions were defeated only by a last-minute barrage of letters from a group of large corporate users — both AT&T and non-AT&T customers — urging Sikes not to restrict or abolish Tariff 12 offers.

On Tariffs 12 and 15, the FCC dispensed with the immediate concerns by ruling on narrow grounds and leaving the bigger question of whether customer-specific deals are legal until a future proceeding. That proceeding will examine individualized tariffs in the context of industry competition and AT&T’s market status — an inquiry former FCC Commissioner Patricia Diaz Dennis considered vital to regulatory reform and tried in vain to push through the previous commission.

Sikes has also slowed the momentum that was building behind applying price cap regulation to the local exchange carriers. At a hearing before Congress earlier this year, Sikes told the lawmakers he was withholding judgment on the issue and was skeptical that the agency could meet its scheduled date of July 1990 for implementation of the new rules.

All of these actions indicate that Sikes is willing to call a temporary time-out to give everyone a hearing on these controversial issues. It is well-known that Sikes tends to favor less regulation and more emphasis on marketplace principles. No one expects him to become a zealous overregulator. But by taking time to study the issues rather than rushing to judgment, Sikes is off to a good start.

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During the week, you'll want to visit the SUPERHOME and SUPEROFFICE. This full-scale working model demonstrates advanced home and office equipment of the future. It's brought to you by BellSouth in cooperation with USTA, TIA, and IEEE. Vendors and local exchange telephone companies will provide communications and television products and services including home medical monitoring, robotics, intelligent networking, fiber-to-the-living unit, energy management, integrated services digital networks, advanced television, and more.

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Monday through Wednesday, ICC '90 is sponsored by the Communications Society of The Institute of Electrical and Electronics Engineers. The overall theme is "Communications —Foundation for the 21st Century." Subjects will focus on three sub-themes: *Intelligent Networks*, *Visual Information*, and *Achieving the Potential of Information Expansion.* There are moderate registration fees to attend the four dozen ICC '90 technical seminars, four tutorials, and the separate track of 24 special technical sessions geared toward SUPERCOMM '90 attendees.

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nt. And now is the time to register!

After a busy knowledge-filled week, you'll want to stay and explore the South's most cosmopolitan city, Atlanta. Shop in the recently renovated Underground with its 12 acres of stores, restaurants, and nightclubs. Enjoy the many museums, historic sites, parks, and other attractions. Or just stroll among the blossoming trees during the springtime Dogwood Festival.

SUPERCOMM® '90 and ICC '90 thank Telephony Magazine and Network World, official publishers of these events. Watch for important information-packed brochures inserted in the January 8, January 29, February 19, and March 5 issues.

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DESKTOP VIDEO

BY MARY JOHNSTON

Today's net plans should include low-bandwidth video

Since the early days of the Picturephone, communications vendors and analysts have forecast widespread acceptance of desktop videoconferencing. However, poor video quality, high costs, lack of standards and the limited human interaction provided by the medium have resulted in much smaller market acceptance than the video industry had originally projected.

For the past several years, video has been treated as a specialty technology to be deployed only at a few strategic sites within a corporation. Video has so far gained acceptance primarily among users that have limited travel budgets or whose applications generally require one-way, lecture-type interaction, such as in education, training or product announcements.

In the last year, however, the convergence of the following significant events has created a near-term opportunity for the success of low-bandwidth desktop and work group video:

- A recognized standard for desktop video operating in increments of 64K bit/sec is nearing completion. Known as the Px64 — or sometimes Nx64 — standard, it is expected to be widely used by vendors building 128K bit/sec video coder/decoders (codec) for the Integrated Services Digital Network Basic Rate Interface environment.
- ISDN is beginning to be deployed commercially, providing a standardized public transport service for low-speed video.
- Low-speed codec picture quality is increasing by orders of magnitude, while costs are dropping steeply. This trend should continue for the next several years as established players such as PictureTel Corp. and Compression Labs, Inc. face off against new competition from venture-funded start-ups, such as Videotelecom Corp.
- Escalating travel costs, combined with stripped-down middle management staffs, encourage the use of video technology to replace traditional meetings.
- Many leading enterprise networks — particularly those in the high-tech, aerospace and manufacturing sectors — are using the excess bandwidth in their T-1 and T-3 backbones to experiment with low-bandwidth video. This experimentation will lead to wider scale deployments in the next two years. Smaller and more traditional companies will learn from these experiences as well.
- Users are seeing satisfactory results from intercompany video services such as US Sprint Communications Co.'s meeting channel.

> As with fax, video demand will escalate as more work groups invest in the technology.
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Combined, these factors point to a wider acceptance of video than ever before. Within the next two years, it is likely that many companies will be using low-bandwidth video to support work group-to-work group interaction.

An example of a good candidate for low-bandwidth video is an engineering firm with distributed project teams. Such organizations already generate hundreds of audio-teleconferences daily. Often, these groups send facsimiles back and forth, then hold conference calls to discuss the materials. Video will improve the transfer of audio and graphical information and concepts between the groups.

As with fax, video demand will escalate as more and more work groups invest in the technology. For the next five or more years, it is the work group, rather than the desktop in general, that will drive the low-bandwidth video market.

The potential proliferation of low-bandwidth video has several implications for the way corporate networks are planned and engineered:

- Video demand will be unpredictable, resulting in high peak-to-average traffic ratios. Network planners must consider how to balance the demands of voice and data applications against video. One solution is to give video priority over voice on private resources — such as T-1 backbones — and spill voice onto the public network when video seizes the resource.
- Large volumes of video traffic, when combined with other new traffic sources such as fax and image file transfer, may tip the network away from T-1 and toward T-3 or away from fractional T-1 and toward full T-1.
- Video standards, like computing standards, will be necessary if the company is to have interoperable video communications. Network planners should begin to establish standards, test equipment to identify preferred vendors and plan for introducing key end users to the service.
- Accessibility to video codecs and technical support for the equipment should be considered. Larger organizations may be able to provide multiroom access by locating a codec on a local-area network rather than in a specific work area.
- Cost recovery and chargeback decisions will dramatically impact the level of acceptance for any new service. Planners must develop policies on whether to initially subsidize video to encourage usage or to recover full costs immediately. The planner must also consider whether to recover costs on a usage or fixed-rate basis.

During 1990, many companies will continue to experiment with low-bandwidth video, while others will make strategic commitments to the technology. Now is the time, before a great deal of money is spent, for corporate communications planners to get ahead of the video learning curve. ◘

Johnston is a principal with Northeast Consulting Resource, Inc., a Boston-based consulting collaborative specializing in management, communications and information strategies.

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TELETOONS

BY FRANK AND TROISE

And now the drama we've all been waiting for.. our network manager's annual budget request..

LETTERS

Defending the vendor

I found your feature article "Vendors who con users and users who trust them" (*NW*, Oct. 2) to be somewhat unfair to the vendor community.

It quotes certain users saying vendors make decisions to use deceitful sales tactics based on the "type of sale" and the "knowledge level of the particular user." Implicit in these remarks are that vendor decisions regarding ethical behavior are typically based on whether a ploy will work.

This is untrue. A way to explain salespeople's behavior that was not mentioned is to look at their company. What is the corporate culture, and what is the message coming from the top? Ultimately, the company is to blame for the misconduct of its salespeople.

While I certainly agree that there are some firms that condone or even encourage this type of behavior, the majority of us — especially in the data communications industry — are fundamentally ethical.

Also, "sins of omission" such as you described are not nearly as common a practice by salespeople as you would let your readers believe.

At our company, we often go out of our way to make sure our customers understand as much about our product as they need to, even if it sometimes means pointing out certain deficiencies in our own system. Our experience is that most users appreciate the honesty and it helps to build a strong relationship that lasts.

The average user in this industry is too well-educated to fall for most of the unfair techniques the article describes. As for the salespeople who use them, they are usually selling cars within a couple of years.

Michael Pisano
District sales manager
Bytex Corp.
Saddlebrook, N.J.

More letters, page 50

Network World *welcomes letters from its readers.*

Letters should be typed, double-spaced and sent to Editor, Network World, *375 Cochituate Road, Box 9171, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

Cutover as balancing act

For most companies, selecting the right private branch exchange is only half the battle. Implementing a PBX cutover can be just as complicated, if not more so.

Management must be coordinated, employees must be trained, systems must be tested — all in an environment that includes personnel turnover, department moves and ongoing business flow.

Companies that have the most problems with PBX implementation are the ones that do not take the time to think through the whole process.

A manager's guide to the [illegible] act of planning, setting up and living through a PBX cutover

A typical PBX selection process involves four basic steps:

- Carefully evaluating in-house needs and expected growth to create a request for proposal.
- Gathering and evaluating vendor PBX information and choosing a supplier.
- Installing the PBX and wiring your offices.
- Establishing training programs to smooth the entry of the new phone system into the day-to-day operations of your company.

The third and fourth steps are part of the installation process and occur simultaneously. But the final step — training — is perhaps the most difficult part of the whole PBX selection and implementation process.

Managers have to teach employees with differing levels of technical sophistication how to use something totally new. And this can be frustrating for all involved.

Briere is president of TeleChoice, Inc., a Manchester, Conn.-based consulting firm specializing in long-distance competitive analysis and network design. Briere can be reached at (203) 645-0471.

Walton is president of Walton & Walton Associates/Communications Consultants of Richmond, Va., a telecommunications consultancy specializing in disaster recovery and network design.

Dealing with change

In general, users deal with a PBX cutover in three ways. There are the innovators — the people who are always looking for new ways to do things and accept change as necessary. These people are a great asset in any PBX cutover because they provide peer support in your organization.

Then there are the nay sayers — the people who reject anything new.

Surprisingly, these people are also an asset because they will be vocal about the things they dislike in the new system. This negative feedback helps you define the way the system will best fit everyone's needs in the company.

Finally, there are the ambivalents — those who are indifferent about the cutover. "If it works, it works. If it doesn't, it doesn't" is their attitude.

These employees are the ones to watch. They can be very detrimental because they may not use the system and they won't take the time to explain why. Telecommunications managers will have to expend a great deal of time and effort to seek out these people and find out why they don't use the system.

Team spirit

Since the installation process affects all aspects of an organization, the best way to deal with it is to form a companywide installation team devoted to merging the new switch with existing operations.

This team should not deal with all of the engineering and design issues of installing the PBX; those are questions best answered by the technical staff. Rather, the installation team should concentrate on the basic operational issue: getting employees to use the system correctly.

Choosing the right people for this team can make or break a cutover. If they are not in tune with company operations, cutover and implementation will seem nearly impossible.

Some factors to think about when picking a team are:

- Be sure to cover all of the primary areas involved in the cutover: voice, data, inside plant or maintenance, finance, employees, managers, consultants and vendors.
- Include managers from key areas. Make sure those selected do not travel a lot and are not already overloaded with responsibility. It is better to have a less visible but more active manager on the team.
- Include data managers and voice managers. While there may be separate departments for each, this is an important time to look toward voice and data integration.
- Choose a sampling of all employees to give opinions from their peer groups. They use the phones every day and will provide the important practical perspective.
- Don't forget the consultants and vendors that are involved. Their experience is invaluable in the process.
- Be sure to include the technical people involved in selecting the PBX. They have the in-house expertise on the new phone system's capabilities.
- Keep in mind that team members are chosen mainly for their input in the implementation process, not necessarily to perform lots of tasks. The best members are those who will be honest in their criticism.

Choose members who are fairly self-confident and aren't scared of voicing their opinions. Also, don't select members with the same attitudes. Promote creativity.

- Above all, pick members who can work well with one another. This team will likely be together for several months.

Getting started

With the team in place, it's time for the first meeting. Make sure everyone knows exactly why they are on the team and what they bring to the group.

Be sure to state the purpose of the group. As with any large project, it is important to maintain a single focus.

Many different problems — wiring, layout and so on — will arise as the project unfolds, but leave them for later or have another committee deal with them.

The team's only concerns should be those issues that directly affect the installation of the PBX.

For those on the team who aren't familiar with the new switch, have the vendor representative give briefings and have

(continued on page 32)

By DANIEL BRIERE and L. THOMAS WALTON

ILLUSTRATION ©1989 BOB DAHM

(continued from page 30)

samples of the new phones available for people to practice on. Also, get or prepare a list of features for each phone and an explanation of what each phone does.

Above all, encourage people to ask questions. It is important to get every member of the team involved early in the process.

Determine the tasks required for installing the PBX; create a time line that shows what must be done and when. Make sure this coincides with dates set by the engineering staff for the actual cutover date of the PBX. Don't forget to take employee vacations and holidays into consideration.

An important warning: If you use a decision-support software package to create the time line, don't let it make all of the decisions alone. If the result of the time analysis doesn't look right, rerun it. Use your gut instinct.

Set up a generic agenda that will be standard for each of the team meetings. Give each member the opportunity to get involved in the discussion, and be sure to keep and distribute minutes of each meeting.

Send these minutes to management to keep them informed about progress. Don't be afraid to tell them too much. More often than not, managers are concerned about being left out of the process.

Keep internal politics in mind. Some managers will resent perceived usurpation of their departments or responsibilities. Others will want to be kept informed on a regular basis. The key is understanding the rules of the game and playing along.

Communications pyramid

Once the team is established, determine how to get the word out about the changes to come. The team will need to rely on a network of key personnel that will aid in the cutover process.

Following the logical flow of information within the firm, create a communications pyramid to provide a means for presenting ideas from all levels:

- **Installation team.** The installation team is at the top of the pyramid. This group of eight to 10 people will oversee the entire PBX installation process.
- **Management.** This is the executive staff charged with getting information to and from the divisions.
- **Administrators.** These managers further communicate with the individual departments and groups within the company. In smaller firms, management and administrators are often the same group.
- **Telecommunications coordinators.** Appointed within their departments by administrators, telecommunications coordinators are the key to the success of the entire chain. They are responsible for ensuring that the needs of their department are represented in the entire process. It is critical that these coordinators understand how their department operates. Longtime employees are often best for this position.
- **Key contacts.** These are key people within the departments — such as head secretaries, project managers and group managers — who are regarded as assets in the process. They can be popular employees, ones who are quick to accept change or ones who are good at teaching others new ideas. Your key contact people will help sell the new system to the employees.
- **End users.** These are the people from whom the team will have to solicit information to determine what is required from the new system. They also are the ones who have to be persuaded to use the new system. They can be very elusive and quiet. This is where the key contacts can help solicit and disseminate information.

Management overview

One driving factor is the importance of the PBX purchase relative to the organization as a whole. If it represents a considerable capital expense for the firm, think about sending out short executive summaries to upper management listing the status of the overall process. Don't waste time with lots of details; just offer enough to keep management up to date.

Provide bottom-line benchmarks. Management likes to see numbers, particularly vis-a-vis the quoted RFP price. Let them know of any cost changes as they occur so there won't be surprises at the end. Also, let them know if there are *no* cost changes.

Above all, be proactive, not reactive, with management. Don't wait to be asked for information; don't miss an opportunity to keep the executive level of the company involved.

Dealing with employees

It is important to motivate acceptance among end users. Let them know everything about the cutover, and involve everyone in the process. Participation will give them a feeling of ownership and help the project succeed.

Develop a communications vehicle for this message. Think about existing company communications: Do most employees find things out through bulletin boards, message centers, interoffice mail, electronic messaging or voice mail?

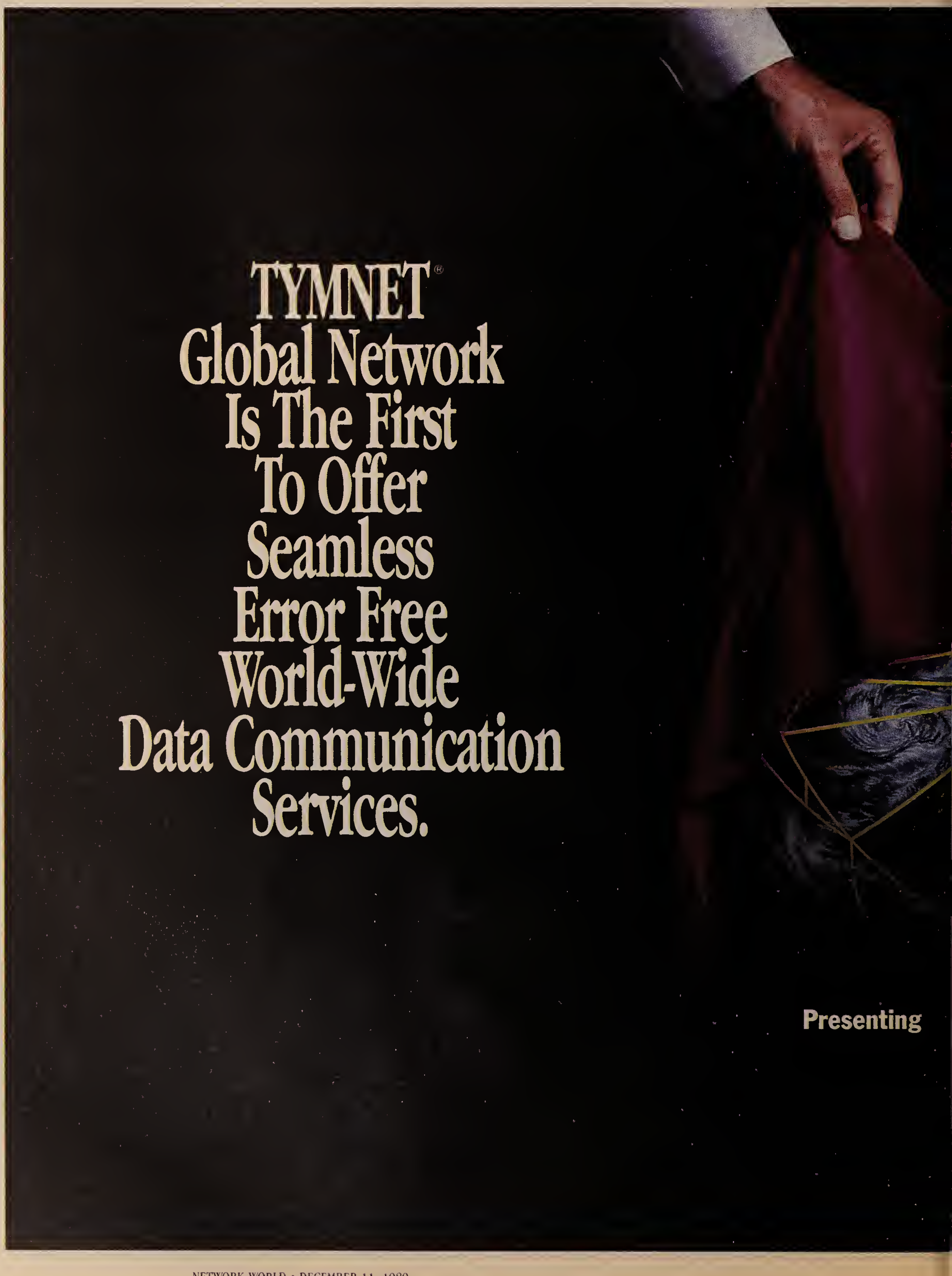
Tailor the message to the medium. Develop a logo, symbol or phrase that employees will associate with the new PBX system. One company started a newsletter designed specifically for the PBX installation. It was called "Tips and Taps" and had a specially designed letterhead. When people saw the newsletter, everyone knew there was some news concerning the cutover.

Don't forget to have a sense of humor when working with people. Remember, many employees may dread the new phone system.

One company collected cartoons about new phone systems from major telecommunications publications and frequently posted them around the office.

Training classes

Training is the most important stage of



the installation process. Many PBX contracts provide for training classes on the new equipment. Work with vendors to make sure their training classes will be tailored to your company's specific needs. Here are some helpful hints:

- While the system may have hundreds of available features, don't overload employees with any more than they will use in the beginning. Explain the top few features, let users practice them first, and add more as users request them.
- Examine the documentation provided by your vendor for classroom instruction. Some vendor training manuals are too long and complicated. Create a feature guide summary for users to carry away with them when they leave the training class. Give them the sense that they are walking away with more than just having sat through a class.
- Offer several training class dates. Hold a training class for each type of telephone set you intend to have on employees' desks. Consider having separate training courses — one for analog sets, one for middle-range digital gear and one for higher level display sets. This way, users won't get bored hearing things they don't need to know.
- Don't forget users who are absent due to sickness, vacation, meetings and so on; provide makeup courses for them.
- Schedule training no more than two weeks prior to the actual cutover date. You don't want users to forget their training before they use the system.
- Train high-visibility users such as executive officers and managers first. These people are role models for the rest of the company. Get them excited, and the excitement will flow downward.
- Be sure that training includes emergency procedures. If you do not have a disaster recovery plan, create one. If the power goes out, make sure each employee knows how to gain direct access to central office lines.
- Training does not have to be boring. Try playing games, such as Dial-a-Feature, and serve cake and coffee. This reduces the anxiety associated with a new system.
- In addition to classroom instruction, train users on an operational system. Get the new sets on employees' desks just prior to cutover so they can try using the system.

In testing the phones for calling in-house, users can get accustomed to the features and there will be fewer mistakes when dealing with outside customers. It also helps to find and isolate system problems.

Cutover day

Be prepared for user-related problems on cutover day. Cutover problems are usually not hardware-related; by the time the system goes on-line, most of the bugs are out. At that point, the problems are in getting people used to the system and making sure they have the right features and know how to use them.

- On cutover day, have a telephone extension dedicated to serve as an in-house hot line for system questions and problems. This offers a central interface point between users and system technicians. This "hot desk" also allows you to separate problem calls that are hardware-related from those that are user-related.
- Make it easy for users to report problems. Have all necessary documents at the hot desk to speed responses to questions. The longer someone has to spend waiting for an answer, the less likely they'll call again with other problems.
- Keep a stock of problem tickets handy. If you get a lot of calls from a particular area or from one type of user, that tells you something. Some may be simple to resolve, either by distributing extra documentation to explain a particular function or by giving a quick explanation. Others may require hardware or software work.
- Provide users with a survey form that makes it easy for them to check and see if they can get a dial tone and whether their features are working. If there is a problem, they should call the hot line. Have a form on all users' desks before they get in on cutover day.
- Have some of your telecommunications coordinators and installation team members roaming around to ask users how the phones are working. This is the personal touch. Users are often too embarrassed to call the hot line to ask a question but will ask if prompted. Also, some functions are difficult to explain over the phone. But more importantly, this shows you are interested in their input.
- Be sure to have one person who is knowledgeable about the system located at the executive offices. Some executives think they don't need training and can figure it out on their own. Accept this attitude as reality and be prepared for any problems.
- Finally, so that orders for telephone features may be taken quickly, have add/delete order forms at the hot desk.

Following up

It is important to track the usage of the system. Revisit each department 30 days after cutover and survey the users. Ask what problems they are having with the system. Don't wait to hear from them; go talk with them. Most new PBXs can print out reports showing usage of features by each extension. These printouts can indicate which employees need additional training.

Also, make sure that each phone is labeled with the correct extension number. As phones are replaced during cutover, the numbers are often not changed.

Finally, regard training as a regular task. Schedule refresher courses each year or as needed.

Above all, have fun with your installation team throughout the whole cutover process. You're likely to spend a lot of time with these people; let them know you respect them and enjoy working with them. It's the little things that make the difference. ◼

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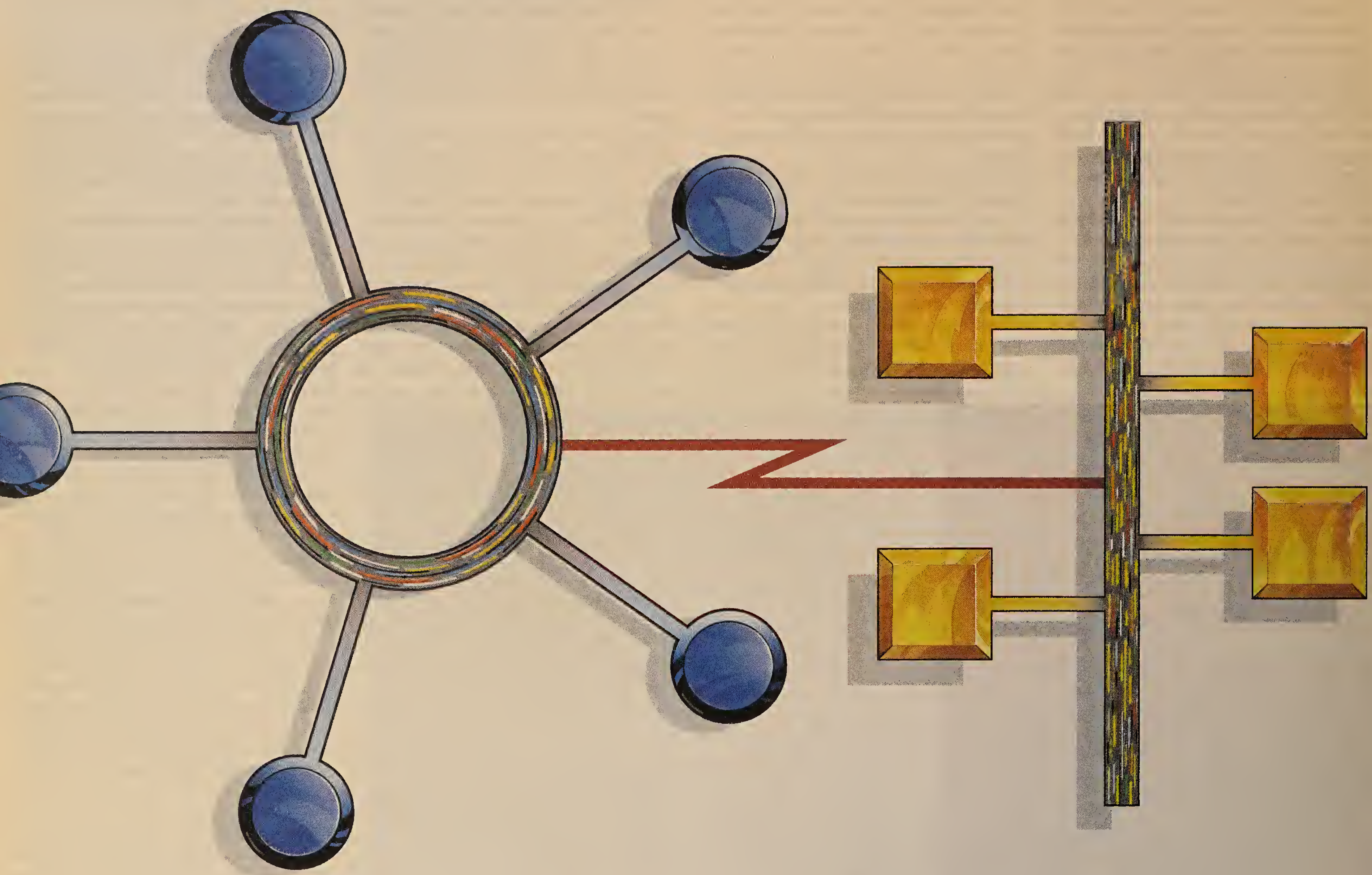

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DATACOM

BUYER'S GUIDE

PACKET SWITCHES AND PADS

Switch hitters

Packet switching is thriving but may soon begin to feel the heat from ISDN and fractional T-1 technologies.

By JOHN HUNTER

CONTINUED FROM PAGE 1

nals or workstations, packetizes and depacketizes asynchronous and synchronous data, performs protocol conversion and speed conversion, appends control information to the packets and transmits them to a public packet network or passes them to a packet switch for transmission through a private network.

In many instances, the net may consist of separate PADs and packet switches, but as the chart beginning on page 40 shows, several vendors offer switches with built-in PADs. Such a configuration means that non-X.25 devices can be connected using only two interfaces instead of four. The internal PAD also reduces the overall cost of communications since an external PAD is not required.

Before a PAD can be connected to a public packet network, it must be certified as interoperable with the network by the network service provider. The accompanying chart lists the certified public networks for each PAD.

Hunter is president of TMS Corp., a telecommunications consulting firm in Wayne, Pa.

Switch considerations

Users shopping for packet switches are often confused by the lingo of the technology, so here are a few simple explanations:

Maximum lines and maximum trunks indicate the number of I/O lines and trunks that can be configured. If the numbers are the same — as is the case with all switches in this survey except Northern Telecom, Inc.'s DPN-100, Tellabs, Inc.'s Model 331 Xplexer and Tymnet's Turbo-Engine — the switch is usually port-oriented. This al-

(continued on 38)

CHART • GUIDE

A *Network World* Buyer's Guide chart listing the features of a variety of packet switches begins on page 40, and a chart comparing PADs begins on page 46.

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(continued from page 35)

lows users to mix and match data transmission requirements to the switch's facilities.

Buyers, however, should be aware that not all lines and trunks are capable of operating simultaneously, so it would be a good idea to pin the vendor down on that matter.

The Northern Telecom DPN-100 supports 150 trunks at 1.544M bit/sec each (T-1 speed) and accommodates 30,000 lines at 192K bit/sec each. The Tellabs Model 331 Xplexer permits 18 links, each operating at 76.8K bit/sec, to be configured. It also handles 32 local and 125,000 remote lines running at 9.6K bit/sec. The Tymnet Turbo-Engine supports 128 trunks and 256 lines.

Buyers should be aware that not all lines and trunks are capable of operating simultaneously, so it would be a good idea to pin the vendor down on that matter.

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Packet throughput and packet throughput delay are other categories where a vendor explanation is in order. Most vendors use 128-byte packets to measure throughput, but they use different methods to count the number of packets transmitted. Some count one packet in and one out as one packet transmitted, while others count one packet in and one out as two packets transmitted. Some also count only filled packets, and others count partially filled packets.

Packet throughput delay measures the ability of the switch to keep the data link filled without buffering. Some vendors quote throughput delay based on the use of a proprietary protocol, not X.25. Trunk delays are usually shorter when proprietary protocols and maximum data transmission speeds are used as the parameters for the measurement.

The maximum standard X.25 packet size is 4,096 bytes; several vendors adhere to that figure. Usually, the larger packet size means that the switch can handle data-intensive applications such as computer-aided design data transmission more efficiently than a switch supporting smaller packets. That, however, is not always true, especially if packets can be switched at high rates.

The **maximum number of simultaneous calls per second** accommodated — sometimes called call setups — refers to the number of packets that can be set up simultaneously for routing before requesting terminals receive a busy signal. The number of virtual circuits per node indicates the number of temporary connections — as opposed to permanent ones — that can be set up to transfer data through the network. The larger the number of virtual circuits, the more data can be switched around the network.

The Northern Telecom DPN-100 offers T-1 trunk speeds, packet handling and the ability to interface with ISDN networks. According to the vendor, a DPN-100 user can call a packet device on an ISDN network by using a Bell Communications Research TR448 Digital Analysis Routing escape code. The code moves the session from the packet network to ISDN without using a bridge.

Dedicated vs. shared

Public packet services are ideal for companies requiring a high-quality switched network but who are unwilling or unable to bear the cost of private facilities.

Some vendors quote throughput delay based on the use of a proprietary protocol, not X.25.

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The public packet services, however, are not a good deal for every application — especially if the service provider differentiates between dedicated and shared packets. Dedicated packets address all data to one user and are rarely full. Shared packets, on the other hand, contain data for several users and are usually full.

Packet service providers may charge dedicated users by the number of kilopackets transmitted, while shared users are charged by kilocharacters. In such a case, users sending only a few characters per transmission might be better off using a shared packet service. Conversely, users sending many full packets might be better off with a dedicated service.

RBHCs compete

It will come as a surprise to many people that the regional Bell holding companies are also in the packet-switch network business since many RBHCs have kept a low profile in that marketplace. As one observer quipped, "It's like they want to keep it a secret."

(continued on page 44)

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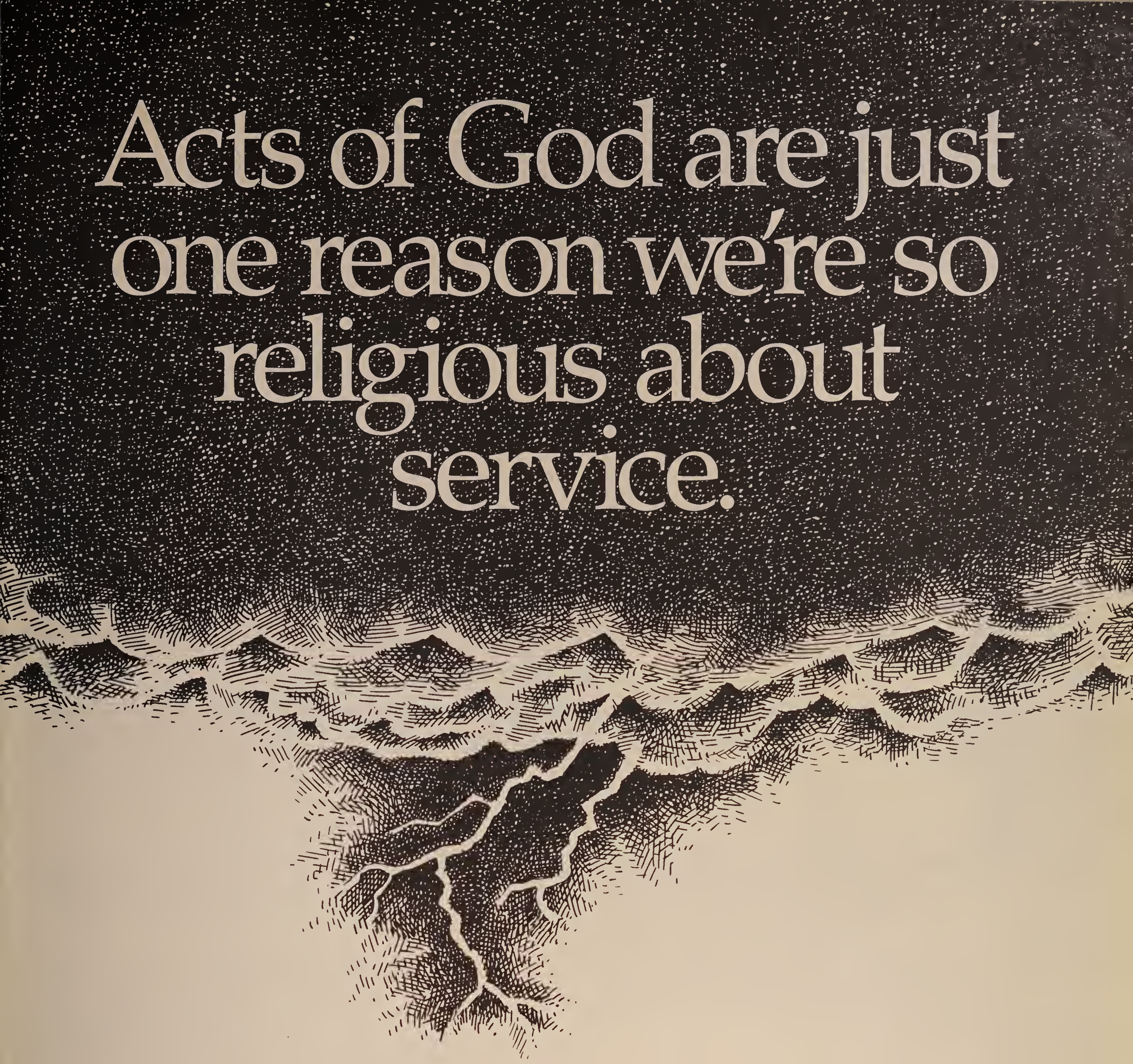

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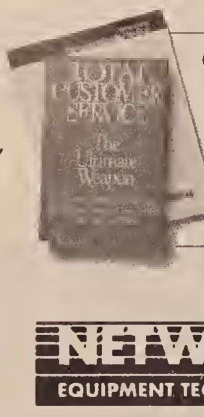

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NETWORK WORLD

Packet switches (continued on page 44)

Vendor	Product	Maximum trunks/speed (bit/sec)	Maximum throughput with 128-byte packet (packet/sec)	Maximum packet size (bytes)	Maximum simultaneous calls per second	Maximum virtual circuits per node	Internal PAD provided	Protocols supported	Packet throughput delay (msec)	Number of retransmissions	Queue size (packets)	Price
Amnet, Inc. **Framingham, Mass.** **(508) 879-6306**	Nucleus 7200 X.25 Concentrator	24/256K	1,000	256	NA	2,000	Yes	IBM SNA/SDLC, BSC; asynchronous; X.25	10	NA	NA	$6,590 for 4 ports
	Nucleus 7400 Network Switching Node	24/256K	750	256	20	240	Yes	IBM SNA/SDLC, BSC; asynchronous; X.25	18	NA	NA	$7,490 for 4 ports
BBN Communications Corp. **Cambridge, Mass.** **(617) 873-3268**	C300	14/64K	Proprietary	1,024	Proprietary	1,200	No	X.25; X.21 bis; X.75	Proprietary	NA	NA	$83,000 to $175,000
CASE/Datatel, Inc. **Cherry Hill, N.J.** **(609) 424-4451**	PSX8500	64/64K	2,600	4,096	NA	4,096	No	X.25	17	NA	NA	$21,000
	PSX8400	32/64K	1,300	4,096	NA	2,048	No	X.25	17	NA	NA	$15,500
Doelz, Inc. **Irvine, Calif.** **(714) 770-1221**	Esprit One	109/64K	2,000	NA	330	25,942	No	NA	80 to 250	Not applicable	NA	$31,680 minimum
Dynatech Communications, Inc. **Woodbridge, Va.** **(703) 550-0011**	CPX 10	10/64K	500	1,024	20	1,024	No	X.25	2	128	Depends on window size	$5,450 to $7,950
	CPX 20	20/64K	1,000	1,024	20	2,048	No	X.25	2	128	Depends on window size	$7,950 to $19,950
EDA Instruments, Inc. **Toronto** **(416) 425-7800**	MPX 25000 Switch	32/100K	2,400	256	3,840	8,192	Yes	Burroughs Poll Select; IBM SNA/SDLC, BSC	0.5	1 to 255	NA	$2,000 minimum
Hewlett-Packard Co. **Cupertino, Calif.** **(408) 257-7000**	Model 45 Multiprotocol Switch	20/50 to 19.2K asynchronous; 4.8K to 64K synchronous	750	256	100	2,048	Yes	Asynchronous; X.25; IBM SNA/SDLC, BSC	20	NA	NA	$6,000
Hughes Network Systems, Inc. **Germantown, Md.** **(301) 428-5500**	9708 MPX	8; 1 at 64K; others at 19.2K	90	512	10	192	No	X.25	15	20	800	$6,900
Infotron Systems Corp. **Cherry Hill, N.J.** **(609) 424-9400**	StreamLine 25	16/1.544M	2,000	4,096	600	4,000	No	X.25; asynchronous; X.75, X.121	12 to 30	NA	NA	$27,000 to $350,000
Memotec Data, Inc. **Montreal** **(514) 738-4781**	SP/MP 9000	54/64K	1,800	1,024	900	2,300	Yes	Asynchronous; X3.28; Visa; Videotex; IBM SNA/SDLC, 3270 BSC, 2780/3780; Burroughs Poll Select; Sperry Corp. Uniscope, NCR Corp.	10	NA	NA	$11,000 to $72,000
Micom Communications Corp. **Simi Valley, Calif.** **(805) 583-8600**	MB300 PSW	12 X.24; 6/72K and 6/19.2K	320	256	20	128	Yes	X.25; asynchronous	3	20	15	$4,450 for 6 trunks; $7,200 for 12 trunks
Microtronix Datacom, Ltd. **London, Ontario** **(519) 681-3430**	CSI-X.25 Packet Switch	18/2 at 64K, others at 19.2K	70	256	24	254	Yes	IBM SNA/SDLC; Visa; X.3; X.25; X.28; X.29	1	NA	NA	$4,100 to $6,400
Netrix Corp. **Herndon, Va.** **(703) 481-0606**	#1-ISS Circuit Packet Switch	32/1.544M; 600/19.2K	2,100	4,096	600	4,000	No	X.25; X.75; X.121	12 to 30	NA	NA	$18,250 to $350,000
Network Equipment Technologies, Inc. **Access Products Division** **Santa Barbara, Calif.** **(805) 685-1411**	PacketPlus/50 X.25 Switch	16/64K	2,000	512	400	1,920	No	X.25; X.121	1.5 to 15	NA	Over 100	$22,400 for 16 trunks
Northern Telecom, Inc. **Data Networks Division** **Research Triangle Park, N.C.** **(919) 549-5000**	DPN-100	150/1.544M	30,000	512	250	Not applicable	Yes	X.25; X.31 (for ISDN packet handler); X.32; X.75; X.3; X.28; X.29; X.121; IBM SNA/SDLC, BSC; E.164	120	NA	46K bytes	$6,000 to $300,000
OST, Inc. **Chantilly, Va.** **(703) 817-0400**	ECOM 25 Model E	8/19.2K asynchronous; 64K synchronous	200	1,024	40	256	Yes	Asynchronous; synchronous	5.75	Up to 99	NA	$6,350 to $8,030
	ECOM 25 Model M	72/19.2K asynchronous; 64K synchronous	1,000	1,024	40	2,304	Yes	Asynchronous; synchronous	5.75	Up to 99	NA	$15,050 to $65,440
PCI, a Telematics Co. **Calabasas, Calif.** **(818) 880-4900**	SmartNet 3000	16/19.2K or 76.8K	200	4,096	NA	1,024 (256 active)	Yes	Asynchronous; IBM 5250 SNA and 3270 SNA; X.25	10	255	NA	$3,000 to $12,000
SR Systems **Montreal** **(514) 335-6442**	SRS 2200	8/19.2K	60	256	10	64	No	X.25, X.32, IBM SNA/SDLC. Multilink (proprietary)	2	255	60	$1,500 to $3,800
	SRS 2300	16/64K	400	1,024	10	512	Optional	X.25, X.32, IBM SNA/SDLC, Multilink (proprietary)	2	255	60	$4,000 to $8,600
Telematics International, Inc. **Fort Lauderdale, Fla.** **(305) 772-3070**	Series 240	12/64K	500	1,024	30	5,000	Yes	X.25; asynchronous; IBM SNA, SDLC, 3270 BSC, 2780/3780 BSC, remote job entry; Ethernet	5	NA	NA	$12,750 minimum

NA = Information not available

This chart includes a representative selection of vendors in the packet switch market. Most vendors offer other packet switches, and many vendors not included offer a full range of competitive products.

SOURCE: TMS CORP., WAYNE, PA.

DATA
IML
OFF LINE
ON LINE
EPO
REMOTE
LOCAL
We've made a name
for ourselves in connectivity
but you don't know it. Yet...

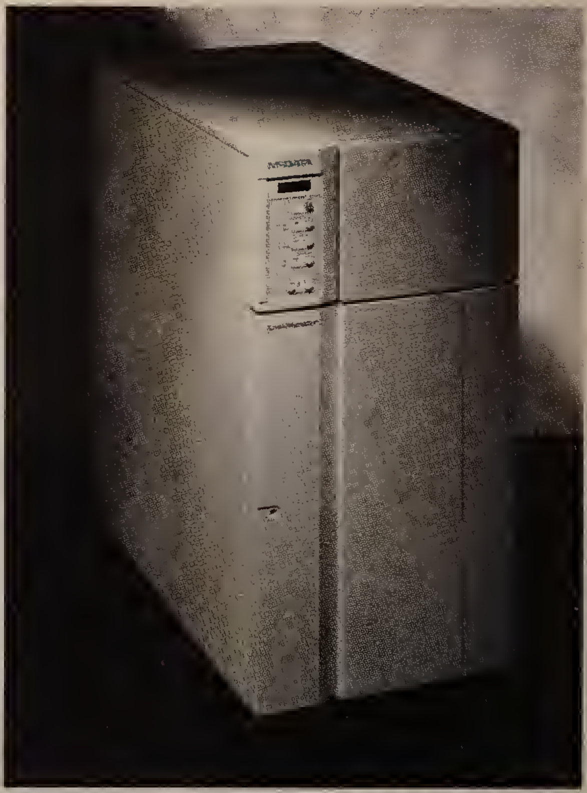
Though we have an installed base of more than 70,000 connectivity devices in more than 38 countries, a worldwide distribution and service system, and are the second-largest manufacturer of 3174 compatible cluster controllers, McDATA is not a familiar name in the industry. Until now, our controllers and other products have gone by many names, sold under private label to widely known vendors.

The 4174 11L supports 64 coax and 24 ASCII devices plus a token ring.

Now we are stepping forward. Twenty new LinkMaster® products, sold under our own name, will change the way the information networking industry thinks and acts about connectivity.

McDATA raises network communications to a new plane of efficiency, going beyond plug-compatibility to a sophistication in connectivity which represents a value in itself, not just a workaday necessity.

For example, for bulk file transfers between hosts, the LinkMaster 6100C network processor allows files on a host to be sent quickly and effectively to not just one, but multiple hosts in multiple locations.


The 6100C network processor utilizes existing channel connections for direct NetView interface.

MCD

Using the LinkMaster 5000 series of channel extenders, disaster recovery backup tapes can be made offsite whenever they are needed, eliminating the time and expense of manual tape transportation.

The 5000 series of channel extenders can be installed in less than one hour.

LinkMaster 4174 controllers interconnect 3270 terminals, ASCII terminals and PCs to multiple hosts, either DEC or IBM. And LinkMaster products enhance network management with direct NetView interface.

These are just a few highlight examples of McDATA's LinkMaster network solutions at work.

LinkMaster goes beyond compatibility to the next stage of the network communications evolution, a comprehensive multivendor connectivity which, in high-speed, long-distance channel communications, represents the next significant horizon to be crossed.

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We span the gaps in network communications. **McDATA**

McDATA Corporation 310 Interlocken Parkway Broomfield, Colorado 80021 (303) 460-9200 **Boston/Chicago/Dallas/Atlanta/Los Angeles/San Francisco/Washington, DC/London/Munich**

DATA

Packet switches (continued from page 40)

Vendor	Product	Maximum trunks/speed (bit/sec)	Maximum throughput with 128-byte packet (packet/sec)	Maximum packet size (bytes)	Maximum simultaneous calls per second	Maximum virtual circuits per node	Internal PAD provided	Protocols supported	Packet throughput delay (msec)	Number of retransmissions	Queue size (packets)	Price
Telenet Communications Corp. **Reston, Va.** **(703) 689-5000**	TP4/III	256/64K	8,000	4,096	125	20,000	Yes	X.25; asynchronous; X.75; X.32; IBM 3270 BSC, HASP	4	255	255	$135,000 and up
Tellabs, Inc. **Lisle, Ill.** **(312) 969-8800**	331 Xplexer Switch	18/76.8K	70 per link	128	30	256 X.25; 4,500 proprietary	Yes	Asynchronous; IBM SNA/SDLC, BSC	100	NA	NA	$2,550 to $13,000
Timeplex, Inc. **Woodcliff Lake, N.J.** **(201) 391-1111**	NP 500	28/128K	500	2,048	100	3,000	Yes	X.25; asynchronous; IBM SNA/SDLC, BSC	2 to 3	NA	NA	$10,900 to $16,900
	NP100E	20/64K	100	2,048	50	800	Yes	X.25; asynchronous; IBM SNA/SDLC, BSC	10 to 12	NA	NA	$4,000 to $9,000
Tymnet/McDonnell Douglas Corp. **San Jose, Calif.** **(408) 946-4900**	Turbo-Engine	128/NA	NA	128	NA	NA	Yes	X.25; IBM SNA/SDLC, 3270 BSC, 2780/3780, HASP; proprietary	NA	Not applicable	Not applicable	$30,000 minimum
	Compact XL	128/64K	NA	128	NA	NA	Yes	X.25; IBM SNA/SDLC, 3270 BSC; asynchronous; synchronous	NA	NA	NA	$26,500

NA = Information not available

This chart includes a representative selection of vendors in the packet switch market. Most vendors offer other packet switches, and many vendors not included offer a full range of competitive products.

SOURCE: TMS CORP., WAYNE, PA.

> "With their packet services, [the RBHCs] are trying to gain knowledge about the data market," Colony says.
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(continued from page 38)

The RBHCs, of course, are restricted by law from inter-local access and transport area networking, which certainly doesn't help their market potential. Therefore, the RBHCs need a long-distance carrier partner to extend the reach of their services beyond intra-LATA end points.

Globenet of Annandale, Va., carried a large amount of the RBHC traffic until it went out of business in mid-September. Now Tymnet and Telenet Communications Corp. carry most of it.

The fact that many RBHCs aren't marketing their packet services aggressively seems to indicate that they aren't serious about being in the business. It could also be that they *are* serious, but not necessarily about packet *networks*.

> Palmer believes the RBHCs are trying to get their feet wet before pursuing customers.
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"With their packet services, [the RBHCs] are trying to gain knowledge about the data market and eventually build a high profile as a data service provider," says George Colony, president of Forrester Research, a Cambridge, Mass.-based market research and consulting firm.

"They're banking on getting relief from their operating restrictions so they can expand their markets. [With their experience] in the packet-switching market, they'll be able to establish credibility among end users," he continues. "[Credibility is] something they now lack."

Jeff Palmer, vice-president of planning and marketing for Cambridge, Mass.-based BBN Communications Corp., doesn't totally agree with that hypothesis. He says, however, that he believes the RBHCs are trying to get their feet wet before vigorously pursuing packet customers.

"This is a relatively new, value-added service for the RBHCs, so many may be taking it slow for a while," Palmer predicts. "We do a lot of work with Michigan Bell [Telephone Co.], and they're aggressively building [the packet-switching] business."

Trouble for packet switchers

With the coming of fractional T-1 networking and the eventual nationwide implementation of ISDN services, it's reasonable to speculate about what will happen to both private and public packet-switched networks.

Gene Gaines, general manager with SR Systems, a Montreal-based packet-switch vendor, says he feels that ISDN will make life tough on packet service providers. "Once ISDN is implemented, we'll have a unified network that will compete with those public [packet] services," he says.

Colony agrees that ISDN will have a negative effect on packet services in the coming decade. In addition, he cites other competition that is here today. "Fractional T-1 gives you high-bandwidth virtual circuits on demand and at a very reasonable cost," he says. "It's going to provide very stiff competition for packet service providers and integrated circuit-switch vendors, too."

> "Once ISDN is implemented, we'll have a unified net that will compete with public [packet] services," SR Systems' Gaines says.
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Hybrid solution

Packet-switch vendors claim that packet throughput delays are so small, they have no effect on time-sensitive protocols such as IBM's Binary Synchronous Communications.

However, the general consensus among users is that as packet-switched networks reach critical mass in terms of the number of nodes they contain, the delays associated with data assembly, transmission and switching will cause the protocol to take a time-out, resulting in dropped sessions.

Some companies have licked this problem by teaming an X.25 PAD with a switching statistical multiplexer or T-1 multiplexer. The combination is used to assign packet-switchable data to private or public packet networks and time-sensitive protocols to non-packet networks.

A couple of years ago, BBN Communications, Telenet and Netrix Corp. were trumpeting products that combined packet- and circuit-switching functions into an integrated switch that allegedly would handle both functions more efficiently.

Only one company in that group has actually delivered so far: Netrix, with its #1-Integrated Switching System (ISS). BBN has put its switch "on the back burner because research revealed that the market demand for such a product isn't strong enough yet," according to a BBN insider. BBN's Palmer says the switch is still an active product, but the company currently has higher priorities. Telenet decided against manufacturing such a product, according to a company spokesperson.

Doug Gainer, director of marketing for data networking at Codex Corp.'s Brampton, Ontario, office, says he thinks that companies selling integrated circuit and packet switches are going to find tough sledding, especially if the prospective customers are now using T-1 multiplexers.

"The T-1 people have a time-division multiplexing orientation, not packet switching," he says. "Getting the packet and T-1 people to agree on a methodology for implementing a circuit switch is going to be tough."

Forrester's Colony agrees that it's not going to be easy to get an integrated circuit and packet switch past the different factions within a company. "The packet people and data people don't talk [to one another], and that alone could block [the switch's] implementation," he says.

Peter Bracken, vice-president of federal systems integration for Martin Marietta Information Group in Lanham, Md., evaluated a number of switches for a network his company was designing for the federal government. He settled on the Netrix #1-ISS because of its internal architecture and ease of programmability.

"The switch will be used for packet and circuit switching, although packet switching will be the dominant application," Bracken says. In addition, the customer plans to migrate to ISDN eventually and, therefore, wanted a product that could be easily migrated.

Bracken said the Netrix product was the best he saw. "The switch architecture lets the user easily reprogram how data is handled, and that's very important to the customer," he says.

(continued on page 50)

> "Getting the packet and T-1 people to agree on a methodology for implementing a switch is going to be tough."
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The Amdahl Difference

There are many networking companies today with claims of superior solutions and products. And many products are here and gone before anyone realizes their existence.

The telecommunications environment is a rapid, constantly advancing challenge. No one knows this better than Amdahl. We have been meeting these challenges for over 20 years with installations in the most demanding environments. And we continue to meet the challenge with products such as our 4745 Communications Processors and our Network Processor Series 2700. A product line designed to meet today's challenges with a platform to meet tomorrow's goals.

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Packet assembler/disassemblers (continued on page 50)

Vendor	Product	Maximum ports	Maximum speed per port (bit/sec)	Maximum trunks	Maximum speed per trunk (bit/sec)	Protocols	Buffer size (bytes)	Maximum simultaneous virtual circuits	Maximum packet size (bytes)	Packet network certification	Price
BBN Communications Corp. **Cambridge, Mass.** **(617) 873-3268**	C/10	64 asynchronous, 32 synchronous	19.2K asynchronous	2	64K	Asynchronous; X.3; X.28; X.29; IBM SNA, SDLC; 3270 BSC, HASP; X.780	NA	128	1,024	NA	$5,000 to $27,000
CASE/Datatel, Inc. **Cherry Hill, N.J.** **(609) 424-4451**	PSX8200	8	19.2K	2	64K	Asynchronous; IBM 3270 BSC, SNA/SDLC, 5250 SNA/SDLC; Honeywell Bull, Inc. VIP 7700/7800	256K	80	512	18	$4,600 minimum
	PSX8160	8	19.2K	NA	64K	X.25, X.3, X.28, X.29	256K	8	256	1, 10, 18, 21	$1,900
Datagraf, Inc. **Austin, Texas** **(512) 288-0453**	Burroughs T-PAD	1 X.25	19.2K; 56K, 64K or 192K optional	NA	NA	Burroughs Poll Select, Honeywell VIP, Sperry Corp. UTS-40, asynchronous	256K	16 standard; 8, 16, 24 optional	1,024	1, AT&T ISDN	$3,465; $3,064 for 8 virtual circuits; $3,865 for 24 virtual circuits
	SU-UT-40 T-PAD/H-PAD	1 X.25 or 1 Sperry UTS 40	19.2K; 56K, 64K, 128K optional	NA	NA	Sperry UTS 20/40; Honeywell VIP; Burroughs Poll Select; IBM 3174, 53XX, 3770, HASP, remote job entry; asynchronous	256K	16 standard	1,024	1, AT&T ISDN	$5,325; $3,130 for 8 virtual circuits
Doelz, Inc. **Irvine, Calif.** **(714) 770-1221**	Elite One	16	64K	6	64K	NA	NA	32	NA	None (not an X.25 PAD)	$3,770
Dynatech Communications, Inc. **Woodbridge, Va.** **(703) 550-0011**	CPX 16	16	19.2K	1	64K	Asynchronous, X.25	1,024	17	256	NA	$2,450 to $4,650
	CPX 432	32	19.2K	4	64K	Asynchronous, X.25	1,024	2,048	1,024	NA	$9,150 to $12,750
EDA Instruments, Inc. **Toronto** **(416) 425-7800**	MPX 25000	256	19.2K	32	100K	Asynchronous; HP ENQ; Sperry Uniscope; Burroughs Poll Select; IBM SNA/SDLC and BSC; Qantel QSP	NA	4,096	256	NA	$1,000 minimum
Eicon Technology Corp. **Lachine, Quebec** **(514) 333-8543**	Access/X.25	1	NA	128	NA	X.25, X.3, X.28, X.29	5K per virtual circuit	256	4,096	NA	$995 to $2,695
Gandalf Data, Inc. **Wheeling, Ill.** **(312) 541-6060**	NPAD	16	NA	16	NA	Asynchronous; IBM 5250, SNA/SDLC, BSC, 2780/3780, RJE; Burroughs Poll Select	5.12K	256	1,024	1,5,18	$7,450
	XMUX	32	19.2K	2	64K	Asynchronous	153.6K	32	256	7, 11, 13, 18, 21	$3,150 to $5,200
Hewlett-Packard Co. **Cupertino, Calif.** **(408) 257-7000**	HP 2335A	16	110 to 19.2K	1	1.2K to 19.2K	Asynchronous, X.25	NA	17	128	7, 8, 10, 11, 13, 14, 17, 18, 21, Eirpac	$2,550 to $5,250
Hughes Network Systems, Inc. **Germantown, Md.** **(301) 428-5500**	9665 Access Processor	6	19.2K	2	64K	IBM SNA/SDLC; Qualified Logical Link Control; X.25	96K	128	256	1 through 22	$5,300 to $6,300
Jupiter Technology, Inc. **Waltham, Mass.** **(617) 890-4555**	System 1000	624 asynchronous, 136 synchronous	19.2K asynchronous, 56K synchronous	52	2M	IBM BSC, SNA/SDLC; asynchronous; X.25; IEEE 802.3; TCP/IP	128 to 2,048	128	2,048	1, 4, 5, 10, 11	$20,000 to $50,000
	System 100	384 asynchronous, 68 synchronous	19.2K asynchronous, 56K synchronous	32	2M	IBM BSC, SNA/SDLC; X.25; TCP/IP; IEEE 802.3; HDLC	128 to 2,048	128	2,048	1, 4, 5, 10, 11	$7,500 to $30,000
Memotec Data, Inc. **Montreal** **(514) 738-4781**	SP/MP8000	48	9.6K to 64K	18	64K	Asynchronous; X3.28; Visa 1; Videotext; IBM SNA/SDLC, 3270 BSC, 2780/3780; Burroughs Poll Select; Sperry Uniscope; NCR Corp.	64K to 192K	128	512	1, 7, 13, 21, Infopath, Pulselink	$2,595 to $18,700
Micom Communications Corp. **Simi Valley, Calif.** **(805) 583-8600**	MB3 Dual Protocol PAD	22 asynchronous	19.2K asynchronous	2 X.25	72K	Asynchronous; IBM SNA/SDLC	192K	66	256	1, 13, 21	$5,680 (for 4 asynchronous channels and 4 synchronous channels)
Microtronix Datacom, Ltd. **London, Ontario** **(519) 681-3430**	CSI-X.25 PAD	16	19.2K	2	64K	IBM SNA/SDLC; Visa; X.25; X.29, X.3; X.28	64 or 384	254	256	7, 13, 15, 21	$2,100 to $6,600
Netrix Corp. **Herndon, Va.** **(703) 481-0606**	#1-AXP/A	24	19.2K	2	64K	X.25, Asynchronous	1M	256	256	NA	$2,995 to $6,995
Network Equipment Technologies, Inc. **Access Products Division** **Santa Barbara, Calif.** **(805) 685-1411**	TX-700 X.25 PAD	32	9.6K	1	64K	Asynchronous, X.25	320K	33	256	1, 2, 3, 7, 8, 10, 11, 14, 18, 21, Euronet	$9,120 (for 32 channels)

Packet services

1 = AT&T's Accunet
2 = ADP's Autonet
3 = Austria's Auspac
4 = Compuserv
5 = Defense Data Network
6 = Defense Network-1
7 = Canada's Datapac
8 = Datex-P
9 = DDX P
10 = Telepac
11 = France's Transpac
12 = Globenet
13 = Telenet Communications's Telenet
14 = Infonet
15 = Infoswitch
16 = IntelPak
17 = Italy's Itapak
18 = U.K.'s PSS
19 = Pacnet
20 = Pienet
21 = McDonnell-Douglas's Tymnet
22 = Venus P

This chart includes a representative selection of vendors in the packet assembler/disassembler market. Most vendors offer other PADs, and many vendors not included offer a full range of competitive products.

SOURCE: TMS CORP., WAYNE, PA.

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Some vendors talk a good integrated network management story. But all their systems really do is monitor parts of your network on different screens. When there's a problem, your operator has to "read between the screens" to find it.

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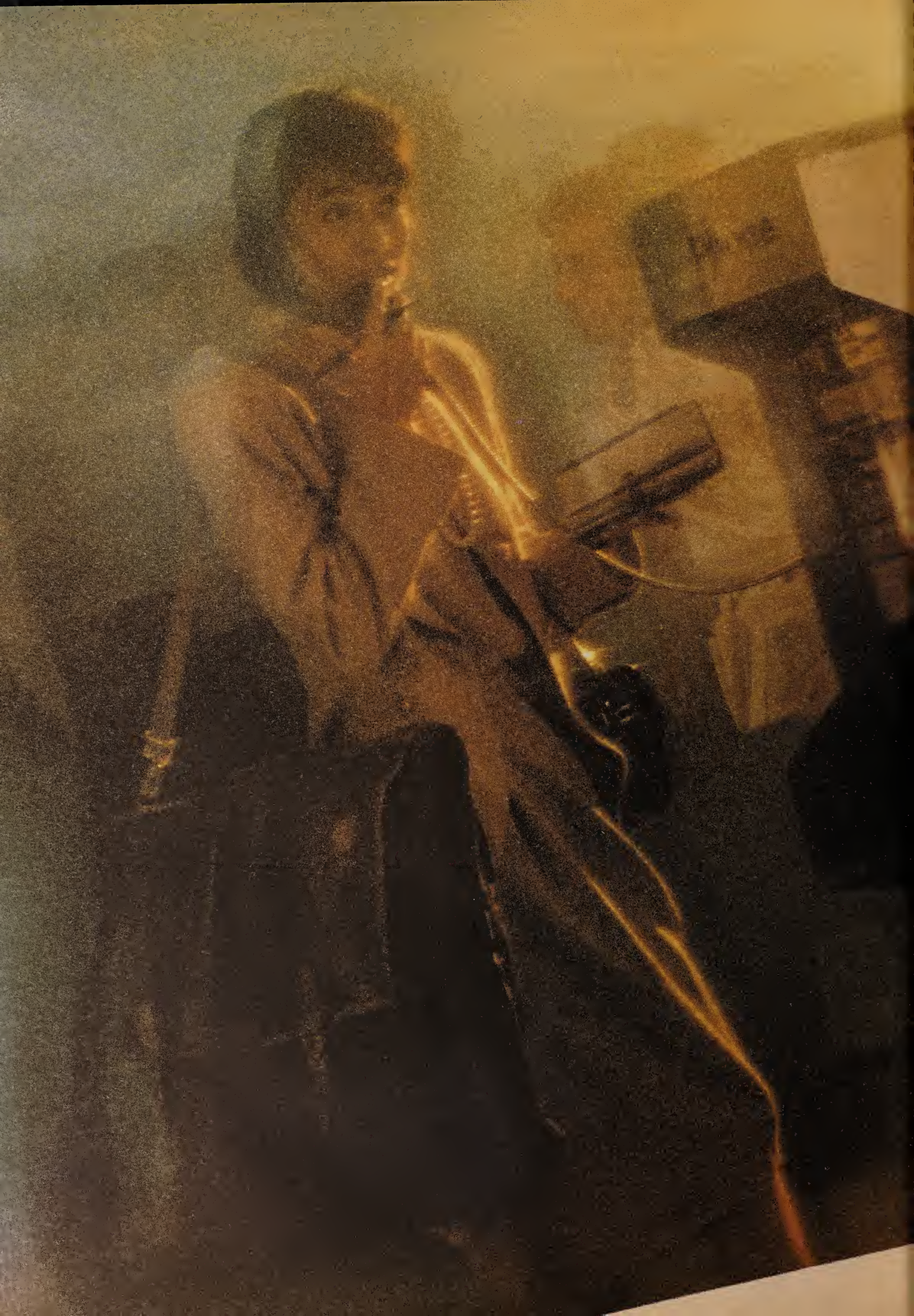

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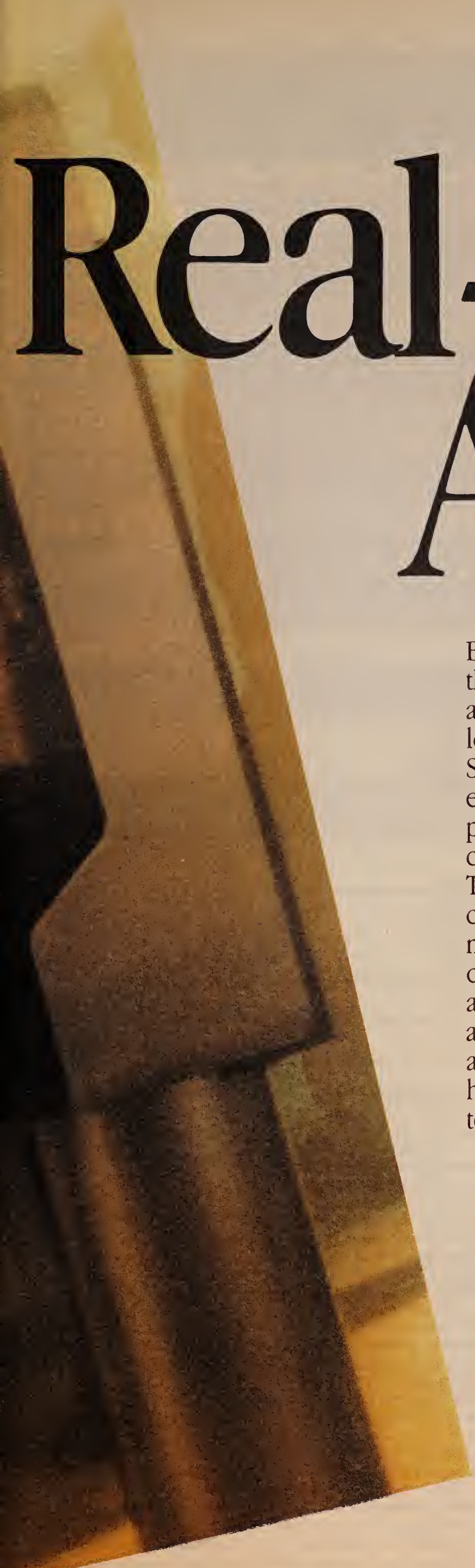

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Packet assembler/disassemblers (continued from page 46)

Vendor	Product	Maximum ports	Maximum speed per port (bit/sec)	Maximum trunks	Maximum speed per trunk (bit/sec)	Protocols	Buffer size (bytes)	Maximum simultaneous virtual circuits	Maximum packet size (bytes)	Packet network certification	Price
Northern Telecom, Inc. Data Networks Division Research Triangle Park, N.C. (919) 549-5000	DPN-100	64	64K	64	64K	NA	NA	4,096	512	NA	$6,000 minimum
OST, Inc. Chantilly, Va. (703) 817-0400	Com+	15	19.2K	4	64K	Asynchronous, X.25, synchronous	1M	128	1,024	13, 14, 19	$5,020 for 4 channels; $7,475 for 16 channels
	ECOM 25 ISP Model M	72	19.2K asynchronous, 64K synchronous	8	64K	Asynchronous, X.25, synchronous	1.5M	256	1,024	13, 14, 19	$15,050 to $41,200
PCI, a Telematics Co. Calabasas, Calif. (818) 880-4900	SmartNet 3000	300	9.6K asynchronous	8	76.8K	Asynchronous; IBM 3270 SNA, 5250 SNA; X.25	1M	256 (1,024 configurable)	4,096	1, 2, 8, 10, 11, 17, 18, 21	$3,000 to $12,000
Penril Datacomm Gaithersburg, Md. (301) 921-8600	VCX	304	19.2K	38	72K	Asynchronous	3.5K on 64	64	256	4, 7, 8, 11, 13, 18, 21, Datanet 1	$1,895 for 8 ports; $15,250 for 64 ports
SR Systems Montreal (514) 335-6442	SRS 3200	7	9.2K	NA	NA	Asynchronous, X.25	40K	8	1,024	NA	$750 to $1,890
	SRS 3300	16	9.6K	NA	NA	Asynchronous, X.25	232K	17	1,024	NA	$2,000 to $4,280
Telenet Communications Corp. Reston, Va. (703) 689-5000	TP8000	16	19.2K asynchronous, 72K synchronous	16	72K	X.25, X.32, asynchronous, IBM 3270 BSC	2M bytes per processor (2 processors per unit)	NA	1,024	NA	$8,000 to $25,000
Tellabs, Inc. Lisle, Ill. (312) 969-8800	331 Xplexer	540	19.2K	18	76.8K	HDLC; IBM SNA/SDLC, BSC; asynchronous	32K	64 per link	128	13, 18	$2,550 to $13,000
Timeplex, Inc. Woodcliff Lake, N.J. (201) 391-1111	TA 48 Async PAD	48	9.6K	2	19.2K	X.3, X.28, X.28	NA	51	1,024	5, 7, 8, 10, 11, 13, 18	$4,000 to $15,000
	TS 10 Sync PAD	1	19.2K	1	19.2K	IBM SNA/SDLC, BSC; Burroughs Poll Select; Sperry Uniscope; Honeywell VIP	NA	256	256	5, 7, 8, 10, 11, 13, 18	$3,400 to $6,900
Tymnet/McDonnell Douglas Corp. San Jose, Calif. (408) 946-4900	TNB3	22	19.2K	2	64K	Asynchronous	NA	32	256	11, 13, 21	$3,995 minimum

Packet services

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6 = Defense Network-1
7 = Canada's Datapac
8 = Datex-P
9 = DDX P
10 = Telepac
11 = France's Transpac
12 = Globenet
13 = Telenet Communications's Telenet
14 = Infonet
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SOURCE: TMS CORP., WAYNE, PA

Packet nets are still a good alternative for firms needing data-routing flexibility.

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(continued from page 44)

Martin Marietta also evaluated the Northern Telecom DPN-100 but rejected it primarily because "its programming was less flexible," according to Bracken.

Another company managing a network for the federal government is SMS Data Products Group, Inc. in McLean, Va. According to Greg Brooks, director of the company's communications division, the network consists of 700 terminals and five host computers, and all must be switchable.

"All data is transferred over two 56K bit/sec links using X.25, so we needed a switch that could handle high data rates and switch [X.25 data streams] quickly," Brooks says. SMS chose the Netrix #1-ISS because, "of the units we evaluated, it performed packet and circuit switching faster."

Short shrift

When integrated switches such as the Netrix unit were announced a couple of years ago, some industry analysts expressed concern that the network management facilities of these switches might get the short shrift over high-speed switching capabilities.

According to Brooks, that's not the case. "We do proactive network management, and the statistical reporting of the [#1-ISS] provides excellent information," he says.

Despite all the promises of future networking technologies, packet networks are still a good alternative for companies needing data-routing flexibility. The switches available today can handle a high volume of inputs and yet are fast enough not to cause intolerable delays.

PADs have gotten better, too. In the past, most handled only asynchronous data at speeds up to 9.6K bit/sec. But now several products are being offered that accommodate synchronous data, and some can operate at 72K bit/sec.

Whether ISDN and fractional T-1 prove to be the undoing of packet nets remains to be seen.

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The public packet-switching networks are also extensive and largely fault-tolerant. And some have links to international packet networks, further extending the user's reach. The accompanying chart, beginning on page 46, lists many PADs certified for foreign packet networks.

Whether ISDN and fractional T-1 prove to be the undoing of packet networks remains to be seen. Both services are only just beginning to be implemented, and no one has enough experience with them on an elementary scale — let alone with complex networks — to determine how good they'll really be.

Steve Jones, Northern Telecom's manager of ISDN and Meridian Digital Centrex products, views ISDN as complementary to, rather than competitive with, packet networks. "ISDN will make it easier to bring packet technology to the desktop," he concludes. "It's a lot cheaper than delivering packets over dedicated lines."

Letters

continued from page 29

Hostile undercurrent?

I must admit that while I find nearly every one of your "Teletoons" on the Opinions Pages comical and appropriate, I am sick of seeing a constant theme of "female berates male."

In our world, there are enough hostilities without a publication creating more in the name of "fun." Perhaps you are not aware of it, but neither females nor males appreciate constantly being made the butt of a joke.

It is time you reconsider this policy and attempt to create humor without the "female dominates male" undercurrent.

Hugh Kallen
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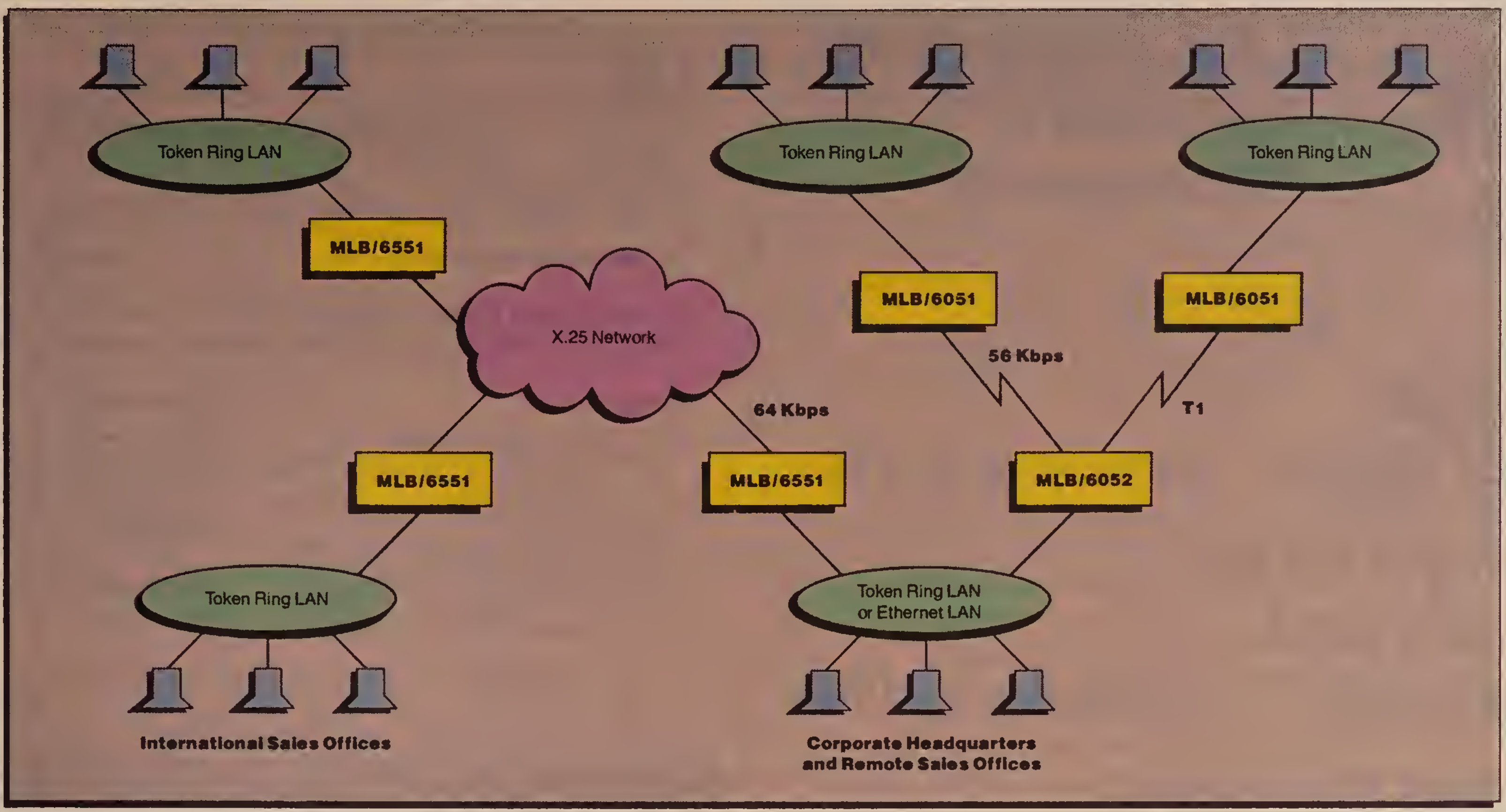

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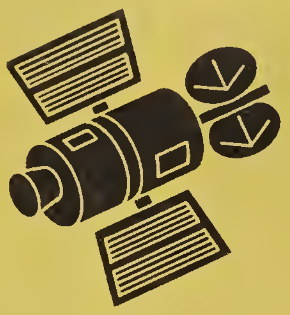

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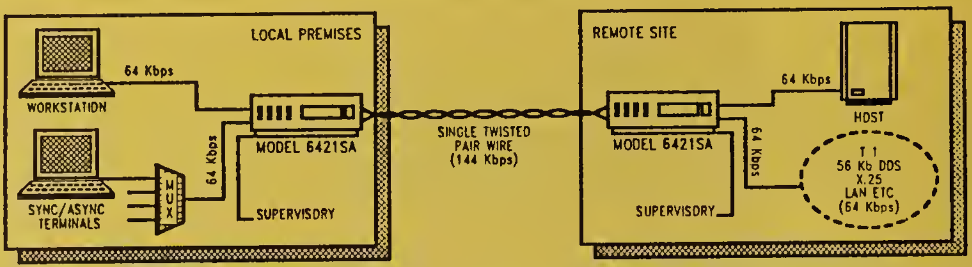

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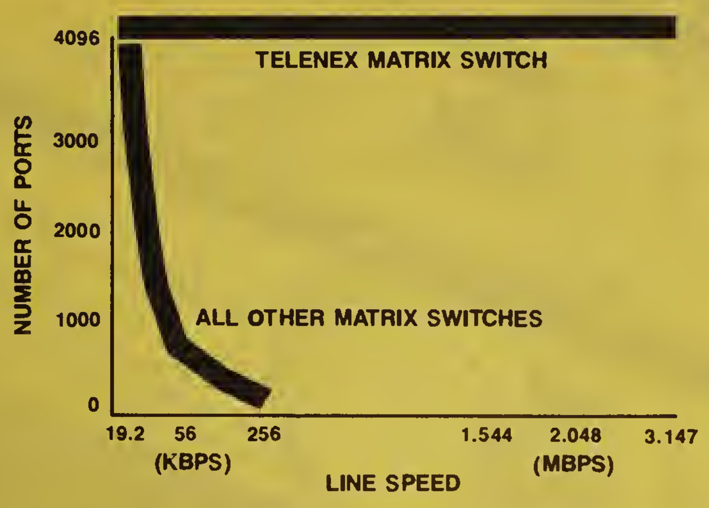

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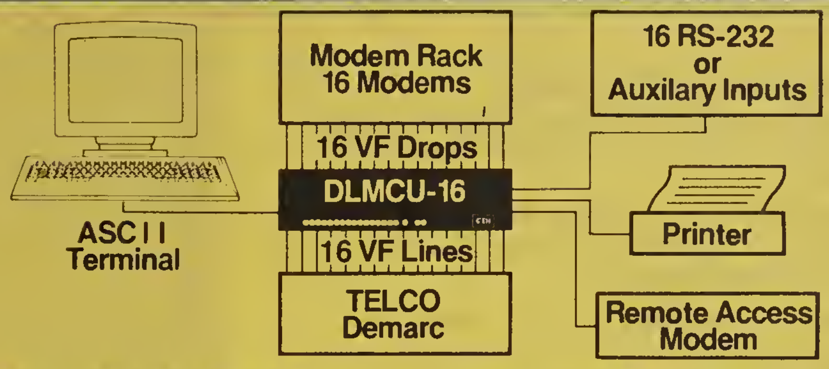

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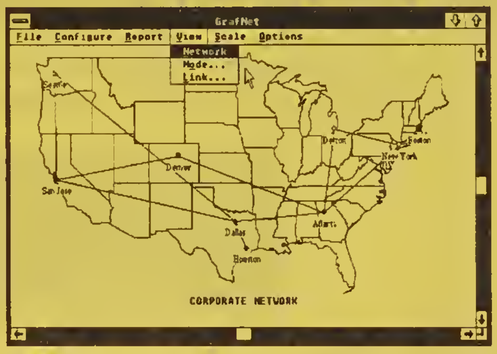

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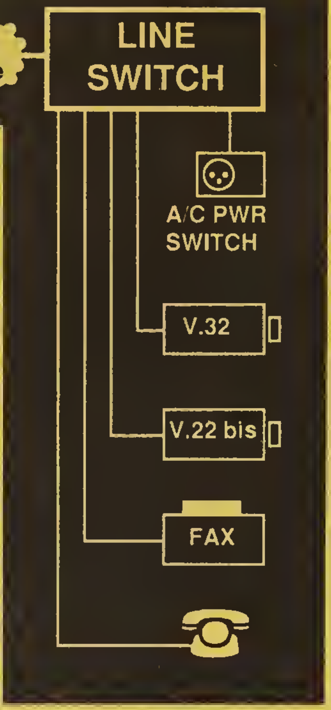

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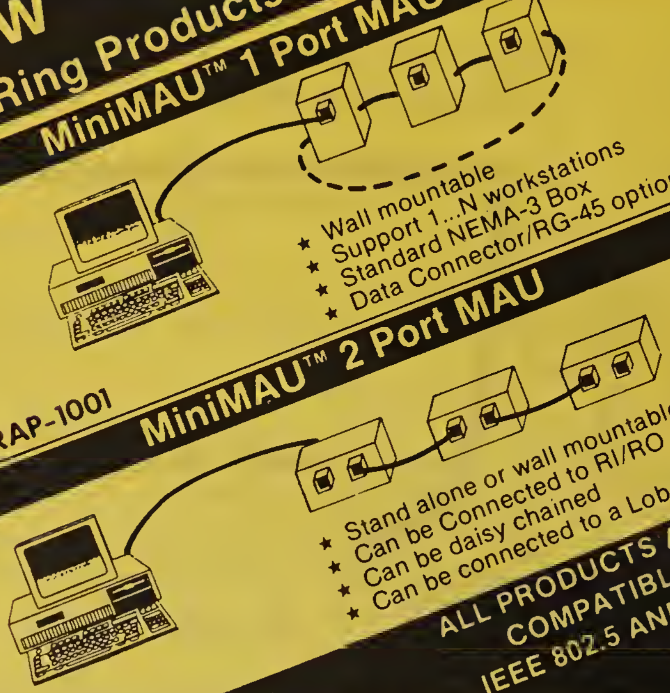

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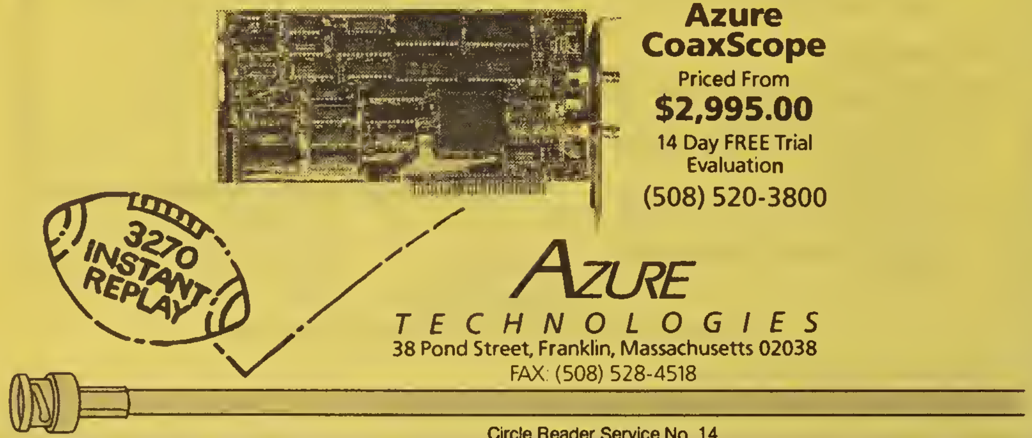

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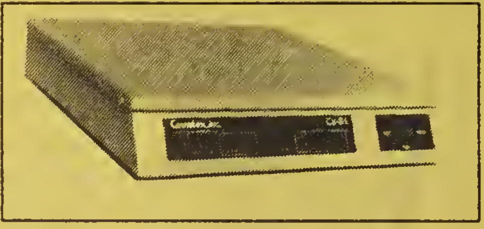

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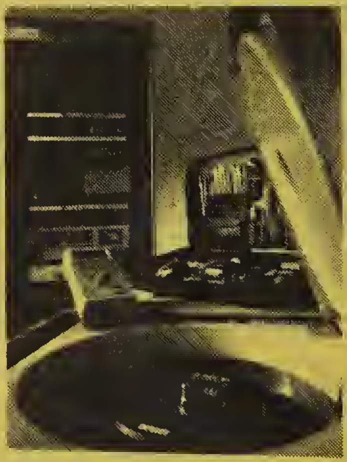

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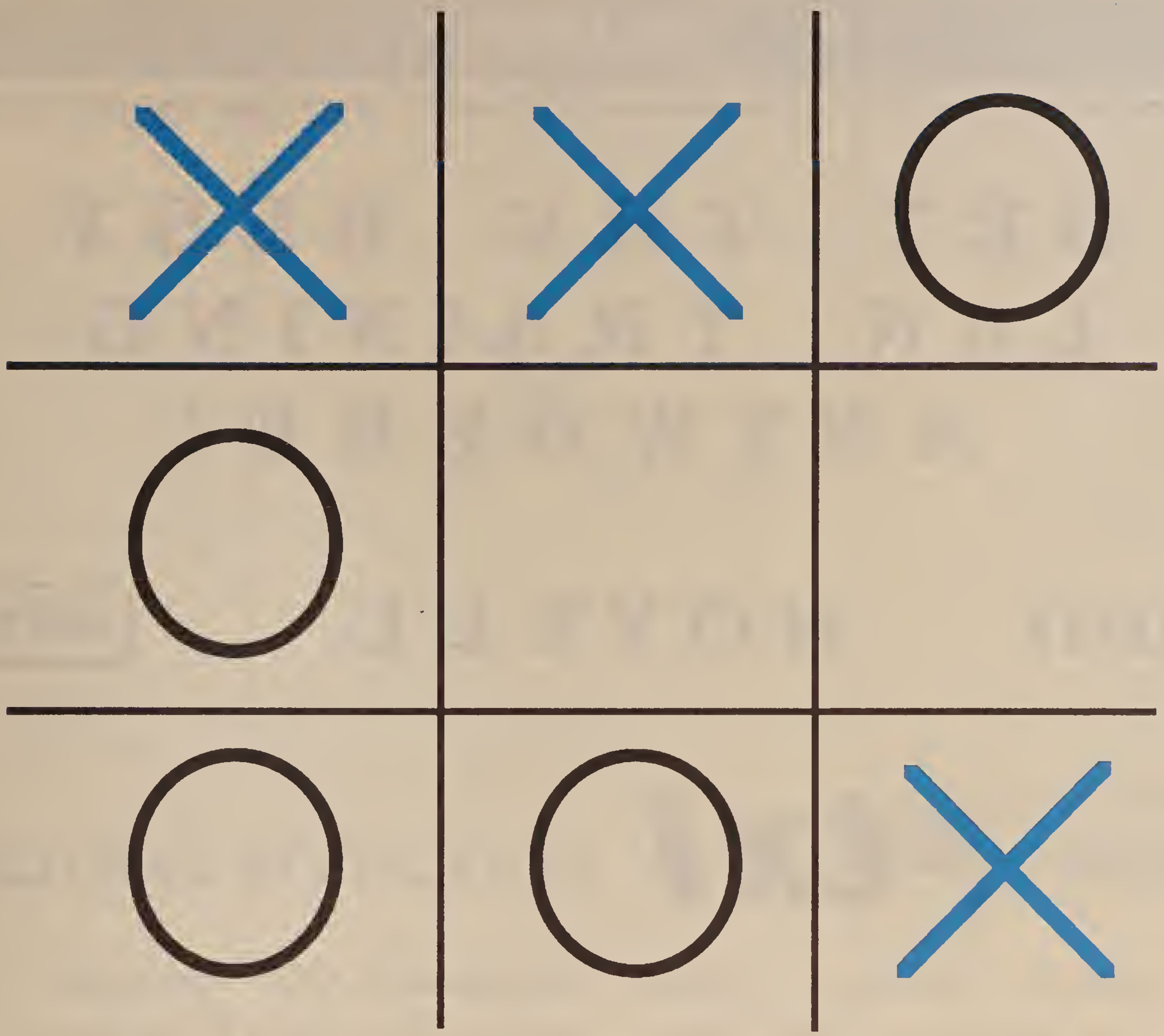

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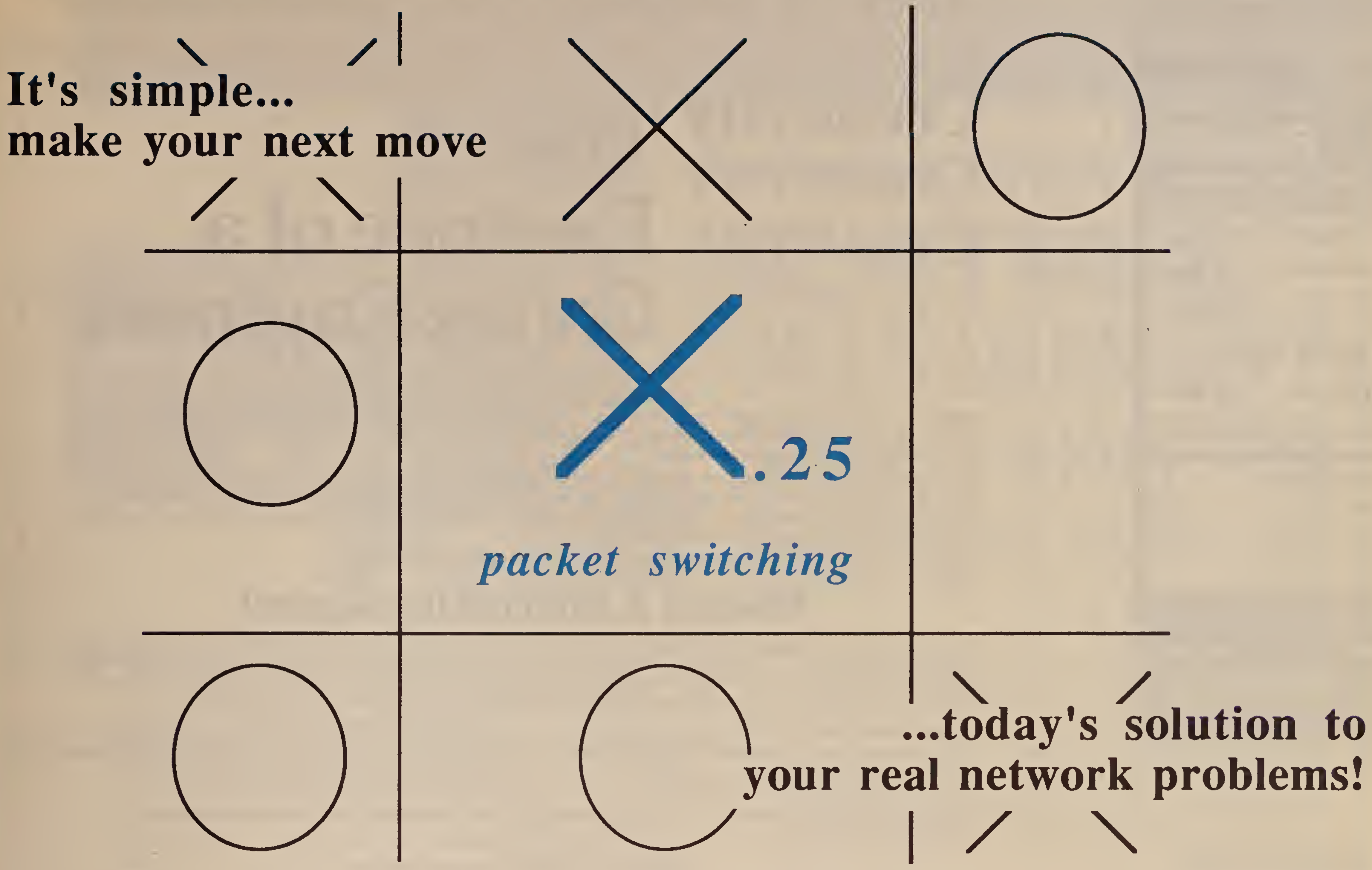

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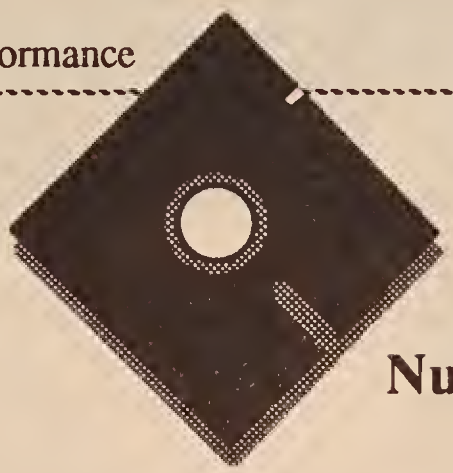

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NETLINE

FEATURE

Toll-free services market set for explosive growth

Bill would let RBHCs make telecom prods

continued from page 12

consider offers from other independent equipment manufacturers.

It also charges the Federal Communications Commission with devising regulations that will enforce these conditions.

Brian Moir, Washington, D.C. counsel for the International Communications Association, has little faith in the FCC's ability to enforce any new safeguards. "It is common knowledge that the FCC is in a declining staff position," he said. "These safeguards show no recognition of the fact that the FCC doesn't have the resources to do its job today."

Moir also said the bill would do little to advance U.S. industrial competitiveness because it does not prohibit the RBHCs from forming joint ventures with foreign manufacturers.

Alan Pearce, president of Information Age Economics, a Washington-based telecommunications research firm, called the domestic manufacturing clause "a major regulatory obstacle" that the RBHCs are not likely to support. This operating restriction adds cost to manufacturing and will make the RBHCs less competitive with other equipment manufacturers.

Arthur Bushkin, vice-president at A.T. Kearney, Inc., a Chicago-based international management consulting firm, said that with this bill, Hollings is "trying to directly protect American jobs. As laudable as the goal is, history tends to show that [artificial market constraints] don't work. We're best off letting the market work."

Tymnet looms as key to British Tel's plan

continued from page 10

serves about 318,000 E-mail mailboxes, while Tymnet's OnTyme service supports 50,000 mailboxes.

Baker also said he would continue with Tymnet's current domestic marketing course set by McDonnell Douglas, which focuses on providing connectivity and value-added network services such as EDI, E-mail, electronic funds transfer and credit card verification to a broad base of users. BT Tymnet "already has a good understanding of the market here," he said.

BT Tymnet has particular expertise in serving the airline and financial services industries, which utilize a number of network protocols, he said.

"Outside the U.S., the important sectors [for BT Tymnet] to get into are those that are significantly globalized," such as manufacturing and transportation, Baker said.

Joint planning between the U.S. and U.K. sales forces on key accounts is a critical first step in fostering growth in this area, he added.

One new area BT Tymnet is expected to explore is providing enhanced facsimile services. "A lot of fax services are currently provisioned across the public switched telephone network over voice lines," Baker said. But certain enhanced fax services, such as multiaddressed faxes and store-and-foward fax, are particularly suited for X.25 networks and represent "a major market opportunity for us to look at," Baker said.

Court reexamines Greene's review

continued from page 4

decision or send the case back to him for reconsideration. The decision is expected by April. Although it is impossible to tell what the judges will ultimately decide, communications attorneys who attended the hearing said that based on the judges' questions and comments, they believe the court will affirm Greene's decision on manufacturing and long distance.

However, they said the court may ask Greene to reconsider his ruling on information services for two reasons.

First, AT&T does not oppose RBHC entry into information services; moreover, the Justice Department — the other principle party in the Consent Decree — has urged the court to lift all restrictions. Second, the RBHCs have argued that denying them the right to publish electronic information violates first amendment rights. The judges seemed convinced by this argument and tend to uphold constitutional rights above other considerations, the attorneys said.

Stephen Shapiro, an attorney for the seven RBHCs, said Greene's refusal to lift business restrictions has produced "indefensible results" in the marketplace. He claimed users are being denied a variety of new information services and innovative new equipment. He said Greene has focused exclusively on whether the RBHCs still have monopoly control over the local exchange in denying them access to new markets. But he contends that Greene is supposed to consider other factors, such as weighing the risks of anticompetitive abuses against the benefits that could result if the RBHCs entered the market.

Alison Leigh Smith, an attorney for the Justice Department, agreed that Greene's review was too narrow. Greene must decide whether the RBHCs could use their monopoly control to impede competition, considering whether changes in the marketplace and regulations would now prevent them from misusing their control.

The appeals court judges responded with sharp questioning of Smith, saying that since the RBHCs seem to have the capability and the incentive to act anticompetitively, it's difficult to demonstrate that they wouldn't act in an abusive manner.

John Ingle, deputy associate general for the FCC, agreed that Greene has erred legally by not giving proper consideration to FCC regulations designed to prevent abuses. Ingle said "disparaging references to the FCC" in Greene's decision prove that the judge is dismissing regulation as a factor in the triennial review.

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The visionaries of the '80s

continued from page 1

cy for the ICA, for raising awareness of users groups in the eyes of public policymakers.

Bennis, a communications manager with Westinghouse Electric Corp. until he retired in 1986, rallied users to lobby telecommunications regulators and policymakers on issues affecting the user community.

As a result, in 1976 the ICA formed a telecommunications public policy committee to undertake such lobbying. Bennis initially served as the committee's chairman and later as its full-time director.

In an interview with *Network World,* Bennis said his greatest accomplishment with the group was "to create a responsible image of the ICA" in Washington, D.C.

Robert Allen

He worked to make AT&T a more nimble competitor.

Wearing his ICA hat, Bennis fought for such causes as reduced special-access tariffs for private networks and increased competition among carriers. At Westinghouse, he led the company in pioneering usage of videoconferencing, T-1 networking and bypass technology.

Tom O'Toole, director of communications systems at Westinghouse, referred to his former colleague as "the father of competition" in the network user community.

"His efforts have paid off — literally — for many network users who have taken advantage of lower prices resulting from increased competition," he said.

Dennis Patrick

His tenure at the FCC was marked by price cap success.

Others had similar praise for Kenneth Phillips, who intervened in dozens of rate cases before federal and state regulatory boards on behalf of the Committee of Corporate Telecommunications Users (CCTU), for which he is director of legislative affairs. The CCTU is an association that represents about 30 of the nation's largest network users before Congress, the Federal Communications Commission and state public utility commissions.

Phillips, vice-president for telecommunications policy at Citicorp, has spoken out in favor of competition in the local loop and has warned users about privacy issues relating to the use of customer information obtained by telephone companies.

"Ken talks totally in the future," said Stan Teitel, chairman of Network Strategies Corp., a San Mateo, Calif.-based consulting firm.

"He thinks of the implications of networks beyond their existing purpose," Teitel said.

Phillips has gained respect in the industry for being both "an intellectual gadfly" and "someone who has had hands-on operational experience," said Diana Lady Dougan, senior advisor at the Center for Strategic and International Studies and chairwoman for the International Communications Group of the ICA. "Ken stays ahead of the curve," she said.

So does Travers Waltrip, who joined The Travelers Corp. in 1983 as vice-president in charge of the telecommunications division of the firm's data processing department. Colleagues and peers said Waltrip is a network pioneer willing to implement new technologies that promise to benefit his company.

Mike Kaminski

His lead at General Motors was a driving force behind MAP/TOP.

Travelers was among the first users of IBM's Token-Ring Network. The company began pilot tests with the technology in 1985 and now has about 100 Token-Ring Networks in operation, said Mark Orenstein, a director in Travelers' telecommunications division.

"Many people don't like to be the first to try something," Orenstein said. "But not Trav."

Tom Blady, director for long-range planning in Travelers' telecommunications division, said that throughout Waltrip's career at Travelers, American Express Co. and American Airlines, Inc., he has stressed the concept of "the network as a utility." Waltrip's theory is that users can benefit in terms of cost savings and advanced features derived from the economies of scale associated with running the network as a utility, Blady said. Waltrip has also been outspoken in public forums — often through user organizations such as the ICA — on the needs of users, he added.

Among other influential users in the 1980s is Michael Corrigan, who now runs the world's largest private telecommunications network — the Federal Telecommunications System (FTS) 2000.

Corrigan took over as deputy commissioner for telecommunications services at the General Services Administration about one year ago.

FTS 2000 is a new project for Corrigan, who's no Johnny-come-lately to the networking field. From 1981 to 1986, he served as lead engineer for one of two design teams that produced competing plans for the Defense Data Network, a packet-switched network for the Department of Defense.

Ken Phillips

He championed user causes on behalf of the CCTU.

After that, Corrigan served a two-year stint as special assistant for integrated digital architecture for the Office of the Assistant Secretary of Defense. While there, Corrigan was a principal author of the Government Open Systems Interconnection Profile, which will become a federal government computer and communications equipment procurement requirement in August 1990.

GOSIP, a selected suite of OSI standards, was created to help simplify for federal agencies the task of tying together computer and communications systems, as well as to encourage development of OSI products.

"Mike recognized when OSI had reached an appropriate level of maturity, and he was a principal mover in seeing that the [Defense Department] started to move away from TCP/IP to OSI," said Marshall Cain, director of member services for the Corporation for Open Systems International in McLean, Va.

Another major player in the OSI arena has been Michael Kaminski, manager of computer-integrated manufacturing/network technologies at General Motors Corp. in Warren, Mich. Led by Kaminski, GM was a driving force in the creation of the MAP/TOP Users Group in 1984 and the North American ISDN Users Forum a few years later. Today, Kaminski is a member of the MAP/TOP Steering Committee.

NETWORKING IN THE 80s

Since the early 1980s, Kaminski has been the most vocal supporter of Manufacturing Automation Protocol, a subset of the OSI standard designed for multivendor factory networks.

While the ultimate fate of MAP has been debated throughout the 1980s, Kaminski has kept the faith, according to Laurie Bride, manager of network architecture at Boeing Computer Services, a division of The Boeing Co. in Seattle and chairwoman of the MAP/TOP Steering Committee.

"Mike has had faith from the very beginning," Bride said. "He's pushed the user community to understand the benefits." That was his first challenge, even before pushing the vendor community to come out with products, she said.

Kaminski said his time promoting MAP has been well-spent. He said that more than 30 GM plants currently are being fully or partially supported by MAP products.

"Up until the early '80s, standards were largely bogged down in the vendor arena," Kaminski said. "I think our major achievement has been to get users involved in setting their own destiny."

True believer

Max Hopper, senior vice-president of information systems at American Airlines, is a believer in the strategic use of technology.

Bill McGowan

MCI's CEO, he played a major role in trying to keep a tight regulatory rein on AT&T.

"Max is a big believer that you've got to know your company's business in order to run a valuable network," one colleague said.

As Hopper has said, "The challenge now is to link information technology to corporate goals."

Hopper, who got the SABRE computerized reservation system up and running in 1976, is now in the process of upgrading the system and building an internal network at American Airlines. Hopper has said that the SABRE network, which enables travel agents to book flights for customers, will be based on OSI and will replace the network's dumb terminals with microcomputers.

The network holds a commanding 35% of the reservation network market.

"Others tend to emulate what Max has done with SABRE," acknowledged Frank Heinzmann, executive vice-president and chief technical officer at System One Corp., which runs a competing computerized reservation net.

"Sometimes it's more important how you market a network than how you build it," said Heinzmann, a self-described friend and competitor of Hopper's. "Max has helped to change the way people travel."

The breakup

Clearly, one of the most important people in the network industry of the '80s was U.S. District Court Judge Harold Greene, who has been at the center of a maelstrom of controversy since the 1984 breakup of AT&T, which he oversaw.

Greene continues to make his presence felt in the industry through his interpretations of the Modified Final Judgment, which controls the business activities of the regional Bell holding companies.

"He's been one of the most influential policymakers in the country," said Mike Connolly, a spokesman for Rep. Edward Markey (D-Mass.), who is chairman of the House Subcommittee on Telecommunications and Finance.

Greene has raised the ire of some, including members of Congress who want to legislate away his control over the industry. Some congressmen want to free the Baby Bells to enter new markets such as long-distance and manufacturing, but Greene has blocked the way. He has allowed the RBHCs only limited opportunities, such as providing the transport services for information services.

Robert Bennis

As head of the ICA, he heightened the awareness of users groups in the minds of telecommunications policymakers.

Sharing much of the spotlight with Greene during the decade has been William McGowan, the chairman and chief executive officer of MCI Communications Corp. and the instigator of the AT&T breakup.

"He's right up there with people like Alexander Graham Bell when you talk about influential people," said Bill Hegge, telecommunications officer at Northwestern Mutual Life Insurance Co., a Milwaukee-based user of MCI services.

"He's responsible for the turf being redefined and competition becoming real in the telecommunications market," Hegge said.

Not only did McGowan help break AT&T's monopoly hold, he steered MCI to its current position as a powerful and profitable competitor in the long-distance market.

According to Jim Blaszak, counsel to the Ad Hoc Telecommunications Users Committee, both MCI and non-MCI users "applaud MCI because it has made the entire marketplace more competitive.

Ray Noorda

He was a stalwart proponent of LANs in the '80s.

Dennis Patrick, who became an FCC commissioner in 1983 and served as chairman from 1987 until about midway through 1989, also tried to spur competition.

Under Patrick, the FCC adopted a plan to cap AT&T's prices — the first major change to traditional rate-of-return regulation. Patrick considered it to be his chief accomplishment.

Patrick, whose philosophy was "the less regulation, the better," also supported AT&T's controversial Tariffs 12 and 15.

"Technology and the public interest are driving changes, and we, as regulators, are in the position of responding," Patrick told *Network World* in an interview.

No mention of influential people would be complete without reference to AT&T Chairman and CEO Robert Allen, who has quietly but aggressively moved to make the telecommunications giant a more responsive and nimble competitor. Since Allen took over the top post at

(continued on 66)

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See the FAXNeT Form on Page #63

Local bypass firms form association

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Four alternative local carriers announced here last week they have created an association that will serve as a single point of contact for users who want to use bypass services in multiple cities.

The four members of the association, dubbed National Metropolitan Networks (NatMet), are Eastern TeleLogic Corp., Inc. in Philadelphia; Institutional Communications Co. in Washington, D.C.; Intermedia Communications of Florida, Inc., based in Tampa, Fla.; and Teleport Communications Group in New York.

The carriers will initially serve 2,000 buildings in 14 cities: Baltimore, Boston, Chicago, Houston, Los Angeles, New York, Philadelphia, Richmond, Va., San Francisco and Washington, D.C., as well as Jacksonville, Miami, Orlando and Tampa, Fla. If members meet their deployment plans, the association will eventually have networks in 30 states.

Robert Annunziata, president of Teleport Communications Group and chairman of NatMet, said members of the group will work together to ensure uniform network quality, services and installation time frames. "It's not just a centralized referral and order-entry operation," he said.

Some details of the association have yet to be worked out, Annunziata said, but NatMet members will probably offer some type of bulk discount to users purchasing services in multiple cities on a long-term commitment. Customers will also be able to obtain a consolidated bill for

(continued on page 68)

Defense Dept. to embrace ANSI

continued from page 4

Policy, which sponsors the MODELS program.

Another drawback with 80-column transactions is that users need to repeat control information, such as activity identification, document number and requisition number, for multiple transactions of a similar type. "With MODELS, a group of transactions that may be functionally related can be incorporated in a single transaction with the control information only required once," Allen said.

This will reduce the department's one billion internal electronic transactions annually, though number or percentage estimates have not been made, he added.

Until now, the prevalence of application software based on the 80-column format made conversion to a format that would permit variable-length documents prohibitive, according to Jack Bartley, systems analyst in the Office of the Assistant Secretary of Defense for Production and Logistics.

X12 was the one solution that offered support for variable-length documents and did not require the department to reprogram existing systems. Instead, the department will use internally developed gateway software to convert DLSS formats to standard X12 EDI formats.

After being translated, EDI documents will be sent through the Defense Automated Addressing System (DAAS), a document store-and-forward net supported by the department's Automated Digital Network (AUTODIN).

AUTODIN is a network with nine domestic switching centers and two hubs, in Dayton, Ohio, and Tracy, Calif. Transactions are routed through the nearest switching center to a Control Data Corp. mainframe-based hub, which relays them to the proper destination, said Bob Moran, chief of the DAAS office in Dayton.

According to Horace Perdieu, director of the Defense Logistics Standard Systems Office, MODELS will eventually be migrated entirely from AUTODIN to the Defense Data Network, a nationwide X.25 packet-switching network.

By the first quarter of 1991, the Defense Department will have gateway specifications and conversion tables completed for Version 1 implementation.

Allen offered no specific productivity improvement or cost savings estimates but said he is certain that both will be realized. "We haven't done heavy-duty documentation of savings or productivity improvements, but there's absolutely no doubt the impact will be massive because of the flexibility we're going to gain," he said.

DEC widens line of image tools

continued from page 4

License fees for DECimage Scan Software range from $268 to $4,700, depending on system size and number of users. The software will be available next month.

DEC also announced an expansion of its relationship with Eastman Kodak, which has already developed the KIMS imaging system, a variety of turnkey imaging sytems based on DEC MicroVAXes and workstations, Goldberg said.

Under the expanded partnership, DEC is working with Eastman Kodak to offer the firm's scanners, optical storage devices and printers as part of its imaging solutions, Goldberg said.

The visionaries of the 1980s

continued from page 1

AT&T in April 1988, the company has become increasingly effective at winning large user contracts with such custom offerings as Tariff 12.

"Since Allen's installation as leader, the company seems more responsive to the needs of large users and more committed to competing in the marketplace," Blaszak said.

"He's gotten rid of a lot of the excesses," said Alan Pearce, president of Information Age Economics, a telecommunications research firm in Washington, D.C. "He brought AT&T into a new competitive era."

The invasion of local-area networks onto the turf of minicomputers and mainframes has been among the most important technological changes in networking, and two of the most influential statesman pushing LANs in the 1980s were Robert Metcalfe, vice-president of marketing at 3Com Corp., and Raymond Noorda, chairman, president and CEO of rival Novell, Inc.

Metcalfe is perhaps best known as the inventor of Ethernet in the 1970s. But in the '80s, he pitched the gospel of LANs to corporate network users.

After leaving Xerox Corp. in 1979, Metcalfe opened the 1980s by serving as the "marriage broker" in bringing Digital Equipment Corp., Intel Corp. and Xerox together in their historic Ethernet standardization project, according to William Krause, 3Com's chairman and CEO.

"He is without question a technical visionary, but he is also an exceptional marketing person," Krause said.

A key to Metcalfe's effectiveness has been his support for industry standards, Dow said.

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A key to Metcalfe's effectiveness has been his support for industry standards, said James Dow, president and CEO at Microcom, Inc., a Norwood, Mass.-based data communications equipment company. "Bob proved that you can build a much larger market with open architectures," he said.

Noorda led Novell's charge to the top of the personal computer LAN market, thanks to great market vision, said Rich Edwards, a senior analyst at Robertson, Stephens & Co., a San Francisco-based investment banking firm.

"He understood the need for critical mass, and he got the support of third-party software firms early on," Edwards said. "Noorda realized that he was treading where IBM should have been, so he needed to get momentum as soon as possible."

Noorda guided Novell to the top of the LAN market by making the company's NetWare products easy to use, said Gary Kwok, vice-president for sales and marketing at LanQuest Group, a San Jose, Calif.-based systems integration and product testing firm. Under Noorda, Novell pursued agreements ensuring that many vendors' adapter boards worked with NetWare, he said.

"Noorda understood that he had to make NetWare available to a lot of people," he explained.

Noorda was a business person before anything else, Kwok said. "He made his own playing field by making NetWare a high-performance operating system and then letting everyone know that performance was what made a good LAN," he said.

LAN group unveils bridge

continued from page 2

ligent T-1 multiplexer or carrier-based services that use central office digital access and cross-connect systems (DACS) for switching. The T-1 multiplexer or DACS can switch single DS0s or bundles of DS0s to remote sites.

Each 6310 supports a single Ethernet and one T-1 link.

Analysts said the move into LAN bridging is a wise one for Codex because it is a potential growth area.

"You've got to be involved in local-area network technology because LANs are so pervasive within user accounts these days, especially larger, more sophisticated accounts," said Mark Leary, director of communications research programs at International Data Corp. in Framingham, Mass.

Larry Cynar, an analyst with the San Jose, Calif., consultancy Dataquest, Inc., agreed with Leary, saying that the 6310 offers features other LAN bridges do not.

"Support for fractional T-1 separates Codex from others that make LAN interconnect products," Cynar said.

Among those competitors are Digital Equipment Corp./Vitalink Communications Corp., 3Com Corp., cisco Systems, Inc. and Wellfleet Communications, Inc., analysts said.

Robert Stearns, vice-president of corporate marketing and business development for Codex, said the 6310 is the first product in what promises to be a major, new strategic push for the company.

"You're going to see us come out with a very broad line of internetworking products," Stearns said, although he declined to provide further details. He hinted, however, that the next product in the line would be a bridge similar to the 6310 but designed for token-ring LANs.

The 6310 is an IEEE 802.3-compatible media access control-layer bridge that supports any higher layer protocol, including DECnet, Transmission Control Protocol/Internet Protocol and Novell, Inc.'s Internetwork Packet Exchange (IPX).

Fractional T-1 support separates Codex from others that make LAN interconnect products.

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The product is a learning bridge in that it determines which addresses correspond to nodes on the local LAN and which are destined for remote LANs. To aid in that process, it has a coprocessor dedicated to filtering packets, off-loading that chore from the main processor to increase efficiency.

Another factor distinguishing the 6310 from the competition is its ability to support from one to 24 64K bit/sec channels without adding hardware.

With competing bridges, users add capacity by buying cards that support four DS0 ports, and the bridges typically support a maximum of only eight ports, Stearns said. That means not only a larger investment in hardware, but the extra bridges occupy ports on a user's T-1 multiplexer, he added.

While that will be good news for users with high-bandwidth LAN bridging requirements, at a price of $11,985, the Codex bridge could be too expensive for users with limited requirements, although Stearns said those users could grow with the 6310 without making extra investments in hardware.

However, Leary said the bridge is competitively priced compared to its competition. "The price puts it right in the ballpark in terms of what you'll find for remote bridges with high-speed capability," he said.

The 6310 is supported by Codex's 9800 Network Management System and includes support for the Open Systems Interconnection Common Management Information Protocol (CMIP), making it the first Codex product with native support for CMIP.

Analysts said 9800 support would be of use to existing customers, but they said they did not think it would help sell the bridge to other customers because of the minimum $50,000 price tag on the network management system.

The 6310 will ship in volume in March; it costs $10,990 for hardware and $995 for software.

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See you in Atlanta,

Gary J. Beach
President
Network World

Days Inns praises feature

continued from page 4

System 85 here and in Knoxville with AT&T's Integrated Services Digital Network PRI software and linked the two sites with a T-1 line supporting PRI. The line is configured to support 23 64K bit/sec B bearer channels and one 64K bit/sec D signaling channel.

When a travel agent calls a Days Inns reservation center here, the System 85 checks for available agents. If all agents are busy, the switch sends a message over the PRI link's D channel to the System 85 at Days Inns' Knoxville reservation center.

The Knoxville PBX then checks for available agents and, if one is free, tells the first switch to transfer the call. The ANI is sent over the D channel and the call is sent over a B channel.

If all agents are busy, the call remains in a queue. The same process can be initiated from the Knoxville reservation operation.

"Look Ahead Interflow has enabled us to operate our reservation process much more efficiently than before. We now make better use of our [automatic call distributor] agents," said Robert McGrail, senior vice-president of marketing for Days Inns.

Before it began using the new routing feature, Days Inns estimated how many calls each reservation center would handle and tried to staff accordingly, McGrail said. "All we could do was hope that we guessed correctly," he added.

When Days Inns guessed wrong, agents in one facility were deluged with calls while reservation agents in the other sat idle. "But now, with Look Ahead Interflow, any agent can handle any call," McGrail explained.

Days Inns said ANI is helping to provide a higher level of customer service to the 900 travel agencies it supports. When an agency calls, Days Inns matches the incoming number against a data base of all agencies. The computer then sends the calling agency's profile to an agent's terminal before the call arrives, McGrail said.

AT&T will charge a $2,000 onetime per-switch fee to activate the look-ahead feature.

AT&T, MCI agree to link E-mail

continued from page 4

ability this year with a number of vendors' private messaging products. The AT&T Mail network also supports electronic data interchange and facsimile services.

Jeff Sturrock, TI's EDI manager, labeled the agreement "wonderful news" in that it will enable TI to interconnect more easily with trading partners who use AT&T Mail. "Interconnectivity was one of the most important things to us in selecting a messaging service provider," he said.

Michael Cavanagh, executive director of the Electronic Mail Association, an Arlington, Va.-based industry trade group, said the AT&T/MCI agreement is a milestone in that the carriers are such high-profile companies.

There are about 8.6 million E-mail users in the U.S., according to research cited by Cavanagh.

RJR saves big with EDI

continued from page 2

olds gets its money sooner, lowering its accounts receivables and slashing the amount of interest it pays on loans to cover its outstanding debts.

R.J. Reynolds encourages its customers to pay their bills via funds transfer by offering participating customers a discount of 0.5% off their invoice price.

Using electronic funds transfer, R.J. Reynolds collects its debts 10 days faster as compared to receiving payments by check. It receives a total of $100 million per year in electronic payments and has the use of that $100 million for an extra 10 days.

"That's a significant interest savings," Coil said. "That's money we don't have to borrow."

To support funds transfers, the company uses Wachovia Bank & Trust Co., N.A. here as the initiating bank. Using the Automated Clearing House (ACH) network, R.J. Reynolds sends a file from its mainframe to Wachovia Bank each night detailing the day's orders to be paid by funds transfer. On the day the goods are to arrive at the customer's site, Wachovia Bank, using the ACH net, initiates an electronic debit from the customer's bank and deposits the money in R.J. Reynolds' account.

About 100 of R.J. Reynolds' customers — out of several thousand — also trade invoices and purchase orders with R.J. Reynolds using an EDI service provided by BT Tymnet, Inc.

Customers transmit EDI documents to BT Tymnet, which places them in a mailbox. From there, they are retrieved by R.J. Reynolds' mainframe about eight times a day. Customers that do not use EDI phone in their orders, which are keyed into the same mainframe application that handles EDI orders.

The company encourages its customers to employ EDI because it increases productivity on both sides, but Coil said it will take time for more customers to jump on the EDI bandwagon.

R.J. Reynolds is not so patient with its suppliers.

"We've hardened our stance, and we're expecting our suppliers to be on EDI now," said Jim Pitts, manager of planning and purchasing for the company.

Coil added, "At some point down the road, [use of EDI] may be the only condition under which we will be doing business with vendors."

R.J. Reynolds is adamant about EDI because it has become an intrinsic element of some of its mainframe-based applications, such as the automated bulk contract program it is targeting at its suppliers. An example of that program is the spare parts system that will automatically generate an order for a part when the supply of that part hits a predefined threshold.

When an employee takes a part, the part's number is keyed into a mainframe application and the rest is automated, Pitts said.

The spare parts system will see if there is a bulk contract for the required part and, if so, will generate a purchase order that will be shipped via EDI to the supplier. The supplier responds with an acknowledgment detailing when the part will ship and later sends the invoice.

When the part is received, the receiver only has to key in the quantity received, and the electronic document is sent to the accounts payable system, which generates a check.

Bypass firms form association

continued from page 66

services in all cities, he said.

NatMet has already been contacted by other carriers interested in joining the association, Annunziata said, although he declined to name any of the companies. Annunziata, along with the chief executive officers of the other three companies currently constitute the board of directors that will decide who may join.

Annunziata said the association wants to make sure that any new members are willing to live up to the same standards of network quality. The fact that some applicants have operations in cities that would compete with existing members would not disqualify them from membership, he said.

An example is Metropolitan Fiber Systems, Inc. (MFS), a growing provider of alternative local services with operational networks across the country.

A spokeswoman for MFS said the company is not interested in joining because it already has networks in many cities.

Mark Lowenstein, a telecommunications analyst with The Yankee Group, a Boston-based research firm, questioned whether NatMet will benefit customers. Carriers are already trying to support high-quality standards and service offerings, he said.

However, he said coordinated billing and volume discounts would be attractive.

Sun fights minis with server

continued from page 1

ured VAX 6000 Model 410's 7 MIPS, for less than half the price. The SPARCserver 490 costs $129,900, and the VAX 6000 Model 410 costs $310,550.

At the same time, the SPARCserver 490 is binary-compatible with all existing SPARC-based systems from Sun and other vendors, enabling it to run the same software.

"Sun has entered the minicomputer space with the SPARCserver 490," said Bob Herwick, who follows the company for investment banker Hambrecht & Quist. "In a lot of technical computing environments that have Sun workstations on the desktop, there are VAXes sitting in corners acting as servers."

The SPARCserver 490 could fill this role well, offering better performance for less money, Herwick said. "Sun's memory pricing is particularly impressive," he added.

A fully loaded SPARCserver 490 can have 32G bytes of disk capacity and 160M bytes of error-correcting code system memory. The SPARCserver 490 has a built-in Ethernet port plus 16 VMEbus expansion slots. It supports multiple Ethernet and Fiber Distributed Data Interface (FDDI) connections.

"Literally hundreds" of Unix workstations, personal computers, dumb terminals and X/Windows terminals can be connected to a single SPARCserver 490, Sun said.

The SPARCserver 490 is not positioned against superservers for personal computer work groups, such as Compaq Computer Corp.'s SystemPro or NetFrame Systems, Inc.'s NetFrame. While personal computers running Sun's Network File System can connect to the SPARCserver 490, it is designed primarily to serve Unix workstations.

> "Sun has entered the minicomputer space with the SPARCserver 490," Herwick said.
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The server owes much of its performance to a disk subsystem based on the industry-standard Intelligent Peripheral Interface (IPI) used in mainframes and minicomputers. Sun's IPI controller has a dedicated on-board processor and can produce a sustained data-transfer rate of 6M byte/sec.

Sun also speeds up the VMEbus in the SPARCserver 490 with a new 4K-byte I/O cache for direct virtual-memory access. This Sun-patented technology reportedly results in a sustained VMEbus data-transfer rate of 15M byte/sec and peak transfer rates of up to 22M byte/sec.

This compares to a sustained throughput of about 10M byte/sec on the SPARCserver 390, which has the same VMEbus but no I/O cache. The I/O cache is also used by the SPARCserver 490's Ethernet and optional FDDI controllers. The cache is a high-speed buffer that moves data directly between the server disks or the network and the server's main memory, bypassing the central processor's cache.

> The SPARCserver 490 is not positioned against superservers for PC work groups.
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A separate 64-bit memory bus further enhances performance by transferring data directly between the central processor and system memory at 120M byte/sec. The system also incorporates a new memory-management unit, allowing faster response times in large multiuser applications.

In conjunction with the server introduction, Sun and Sybase, Inc. released results of a jointly conducted benchmark study that tested the transaction-processing speed of the SPARCserver 490 when running the SPARC version of Sybase's SQL Server 4.0 relational data base.

The server's peak speed was 47 transactions per second in a test using the industry-standard TP1 benchmark.

According to Carl Stolle, a Sun product line manager, this gives the SPARCserver 490 comparable transaction-processing performance to high-end minicomputers at a fraction of the price.

Planned enhancements

Eric Schmidt, vice-president of Sun's General Systems Group, said the SPARCserver 490 will be enhanced in 1990 with fault-tolerant features that are not available in the traditional Unix world but are important to a server environment. These include disk mirroring that will automatically protect against disk failures, as well as incremental backups that can be used for quick reboots in the event of a server crash.

In addition to the SPARCserver 490's impressive price/performance ratio, Sun can offer customers a broad line of binary-compatible, scalable systems — ranging from the SPARCstation 1 at the low end to the SPARCserver 490; all are based on the same SPARC architecture and run the same software. This is something that other system suppliers cannot offer, Herwick said.

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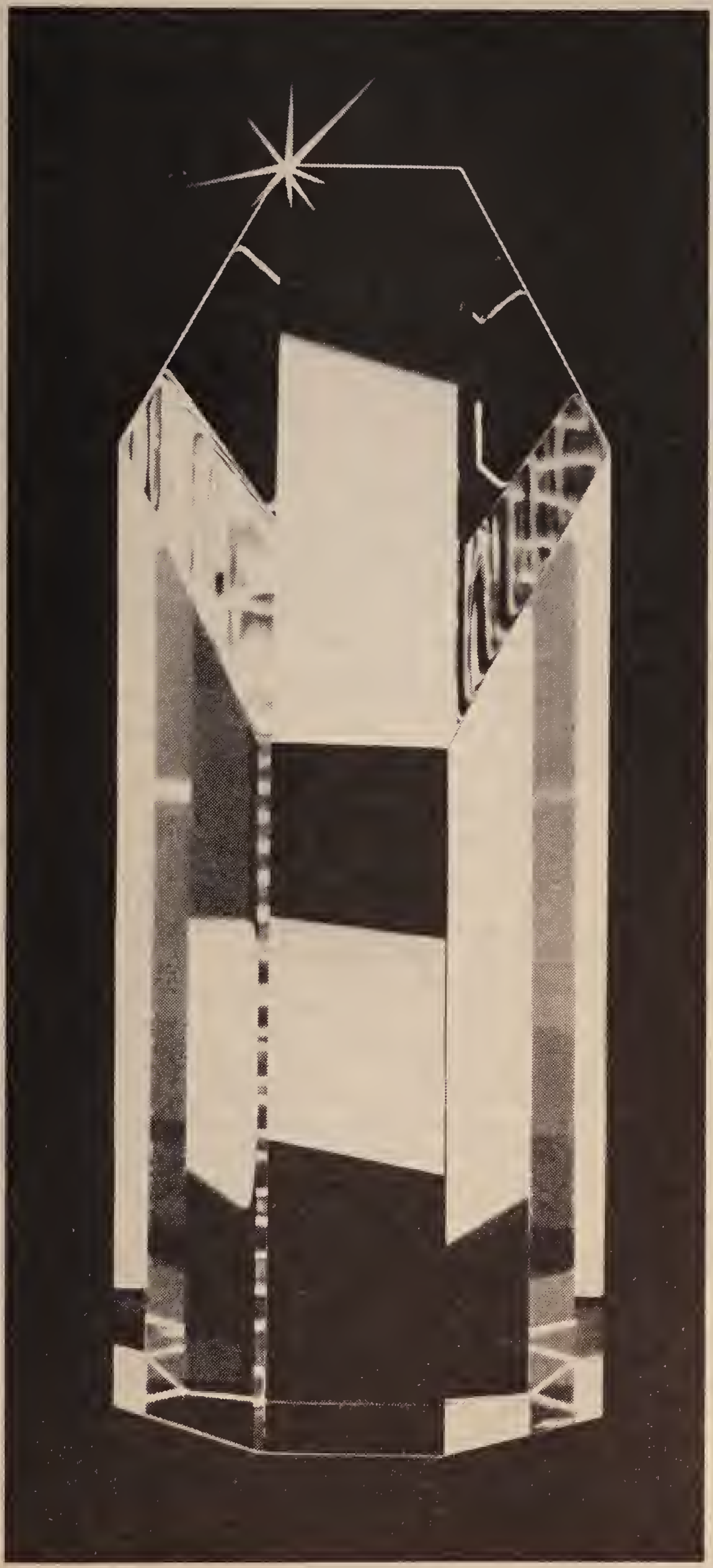

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Lotus looks to LANs with tool

continued from page 1

Manufacturers Hanover Trust Co. and Reuters Information Service, Inc. — that gave enthusiastic, detailed accounts of their experiences with the product.

L. Brewster Jackson, senior vice-president of Reuters, said, "Lotus has really hit on an important emerging technology in groupware software."

Lotus Notes makes it easier for work groups of users to exchange information and coordinate projects regardless of whether they're located in the same office or across the country, said Eric Sall, Lotus' director of business applications for the Lotus Notes product line.

Lotus Notes lets users exchange E-mail and share compound documents containing text, numerical and graphical information. It allows users to access information from a variety of other personal computer applications, including spreadsheets and word processing packages. In addition, with Lotus Notes, users can create shared information systems such as customer tracking systems, status reports, reference libraries and call report tracking.

The server portion of the Network Basic I/O System-compatible application is a data base management system that runs on Novell, Inc.'s NetWare, 3Com Corp.'s 3+Share and 3+Open, and IBM's LAN Server and PC LAN Program networks. Lotus Notes is not certified to run on Banyan Systems, Inc.'s VINES.

A replication feature of Lotus Notes lets users create copies of the same data base on multiple LANs. As users update or revise documents and append files, copies of the data base are updated automatically.

The client portion of the software runs as a Microsoft Corp. Microsoft Windows or IBM Presentation Manager application on any IBM Personal Computer AT or Personal System/2.

Groupware's arrived

"Lotus Notes makes the concept of groupware a reality. For the first time, LAN users can maintain and share identical replicas of a data base on multiple servers on remote networks," Sall said.

"Lotus Notes gives users — regardless of their physical location or type of network — all the [tools] necessary to assemble, organize and distribute information," Sall said. "And it's not limited to just text and numbers; users can also exchange compound documents consisting of text images, worksheets, graphs and files."

While Lotus Notes is hardly the only groupware product on the market — WordPerfect Corp.'s WordPerfect Office is another example — it does have some important features not found in other groupware offerings, according to IDC's Atlas. "No other groupware product currently available has the ability to let users do conference messaging or send many-to-many messages," he explained. "Other E-mail packages don't have audit trails that allow the user to view the entire response history to a broadcast message sent out across the network."

Manufacturers Hanover Trust in New York has beta-tested the product on several NetWare LANs over the past 18 months, according to Rich Luciano, a vice-president of MIS at the bank.

Some of the bank's account officers are already using Lotus Notes' E-mail and data base capabilities to manage information regarding customer account histories and transactions.

"It's perfect for our needs," Luciano said. Six to 10 bank employees usually have to share information about a particular client. "The Notes product is ideal because it lets us share critical customer and client information in a way we couldn't before," Luciano said.

Luciano said Manufacturers Hanover Trust uses the Microsoft Windows user interface. Since Lotus Notes also utilizes Microsoft Windows, this means that it integrates fully with other E-mail, data base and communications that the bank is running. "Our users don't have to learn different commands for different applications, and it makes training a breeze for us," Luciano said.

Lotus Notes is shipping now and will be sold through the company's direct sales force. A license for 200 users, including the server portion of Lotus Notes, costs $62,500. Each additional user copy beyond the 200 minimum costs $295. Volume discounts are available.

Novell refines DBMS plan

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gram to allow the server to store a batch of SQL statements, speeding application execution and reducing network traffic.

NetWare SQL 386 also takes advantage of the 80386 architecture to support a greater number of users on a single server — 250 users, compared with only 100 users supported on the initial NetWare SQL Value-Added Process.

NetWare SQL 386 supports OS/2 applications and DOS applications on client workstations. It also includes a Lotus Development Corp. DataLens Driver that enables Lotus 1-2-3 spreadsheets to read NetWare SQL data.

"Using standard 1-2-3 commands, users can now access information from a NetWare SQL data base," Woodward said.

Key marketing move

The marketing implications of the product are just as important as the technical advantanges of NetWare SQL 386 Version 2.1. Novell executives said the NetWare SQL 386 introduction is part of a renewed push on Novell's part to address the increasingly competitive data base server arena.

Although NetWare SQL has been shipping for two years, it has not been a high-profile product and many users are unaware that Novell had a data base server product, industry analysts said.

This perception must change if Novell is to compete effectively with Microsoft Corp. and Ashton-Tate Corp., which have joined to market SQL Server, Woodward acknowledged.

Almost all of the major data base server vendors, including Oracle Corp., GUPTA Technologies, Inc., Informix Corp. and Relational Technology, Inc. have said they will deliver during 1990 NLM versions of their data base server offerings that will compete with Novell's NetWare SQL 386.

One notable exception is Sybase, Inc., which is contractually obligated to develop data base products for Microsoft's OS/2 LAN Manager. While Sybase also will compete with Novell, it will not offer an NLM. Instead, SQL Server runs on an OS/2-based computer, separate from NetWare's server.

Analysts still wary

Despite the improvements in NetWare SQL 386, analysts remain skeptical about Novell's ability to market NetWare SQL 386 as a mainstream data base server technology. They claimed Novell will be hard-pressed to woo customers outside of its existing user base for Btrieve, an older data base technology Novell offers.

Analysts remain unconvinced that Novell can deliver as good a product as SQL Server and other data base engines.

Richard Finkelstein, president of Performance Computing, Inc., a Chicago-based consulting firm, gave NetWare SQL 386 a mixed review. Finkelstein praised the enhancements in the new NetWare SQL 386 NLM but said Novell is playing a "desperate game of catch-up in the data base server market."

NetWare SQL upgrades

Novell also announced an upgrade to NetWare SQL, its data base engine for NetWare Version 2.15. Although it is slower and supports only 100 users, it contains the same functionality found in NetWare SQL 386 Version 2.1.

NetWare SQL 386 2.1 and NetWare SQL 2.1 will both be available in the first quarter of 1990. NetWare SQL 386 lists for $1,495 per server, and NetWare SQL Version 2.1 costs $595 per server.

Private net users detail projects

continued from page 1

proposition, but it enables large users to offer and administer enhanced network services. That can be a major competitive edge for companies such as airlines," said Steve Sazegari, senior analyst with Dataquest, Inc., a San Jose, Calif.-based consultancy.

Westinghouse Communications expects to complete the migration from a nationwide AT&T Electronic Tandem Network to an SS7-based ISDN net in January or February. The company opted for this setup after rejecting a Tariff 12 custom net proposal from AT&T earlier this year ("MCI wins big Westinghouse net contract," *NW,* May 8).

Westinghouse Communications is installing five Northern Telecom DMS-250 central office switches at MCI points of presence and is using carrier-owned fiber to link the switches to two existing DMS-250s — one at its Pittsburgh world headquarters and the second serving a large site in Baltimore.

Westinghouse Communications is locating the switches at the MCI POPs to substantially reduce access costs.

Collocating the switches at the MCI POPs reduces local access charges and one possible point of failure in the net. "We aren't big believers in the local loop. We found in the past that most of our network problems were in the access lines," said Thomas O'Toole, director of communications systems at Westinghouse Communications.

In the second phase of the ISDN project, Westinghouse Communications began equipping the DMS-250s with Northern Telecom's ISDN Primary Rate Access software interface to provide ISDN services networkwide.

The seven network hubs use more than 200 T-1 lines to support digital access and cross-connect systems (DACS) and packet assembler/disassembler devices located at 37 smaller MCI POPs. The DACSs provide 64K bit/sec or 56K bit/sec channels to surrounding Westinghouse Communications sites.

Adding SS7 to the network is primarily a software installation project, according to O'Toole. "The project is progressing well and without incident, but it's not yet completed. I may not be able to give a final opinion for another month or two," he said.

Although Westinghouse Communications calls ISDN "a strategic direction," the company will base its plans to equip individual private branch exchanges to support ISDN on user demand for features supported by the technology.

Westinghouse Communications has come a long way in terms of support for ISDN.

"We've been ISDN skeptics for years and kept asking what ISDN can do for us that we aren't doing now. But SS7 will enable us to offer enhanced network services in a much more pervasive manner than we can now," O'Toole said.

Westinghouse Communications plans to use ISDN to offer advanced networking features including camp-on, automatic callback and calling line identification across the net by the end of next year.

The company is also looking to ISDN to streamline its computer-aided design and drafting process by enabling Westinghouse Communications designers and job shops to simultaneously view and revise the same parts of drawings. Currently, the two parties exchange paper drawings of parts.

Westinghouse Communications is also migrating its decade-old four-city videoconferencing network to ISDN. "We have 20 sites using freeze-frame videoconferencing, which is [in] pretty bad [shape]. ISDN's bandwidth will let us provide higher quality service."

In the state of California's case, a planned network will link state-owned and -operated Northern Telecom DMS SuperNode switches in San Francisco, Los Angeles and Sacramento, Calif., interconnected with dedicated high-speed links, said Allan Tolman, assistant chief of the General Services Administration's Telecommunications Division.

> "We found in the past that most of our network problems were in the access lines."
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Like Westinghouse Communications, the state of California is looking to SS7 to speed call setup and offer look-ahead dialing, a feature that holds a call at its originating point until an end-to-end path is available. Both also see SS7 as a foundation for future services, including ISDN. The SuperNodes will be installed during the first part of the three-phase networking project, Tolman said.

"In the second phase, we will install SS7. We'll deploy ISDN networkwide in Phase 3 and have the entire network completed in 33 months," Tolman explained.

"By using out-of-band signaling, we'll be able to save on intermachine trunks. If you don't have to use a line to find out that the other end is busy, you'll save a good deal of wear and tear on your network," Tolman said.

According to Northern Telecom, the state will save $30 million to $40 million over the next decade by implementing SS7, integrating access and tandem functionality, optimizing its net, offering private 800 service and centrally managing the net.

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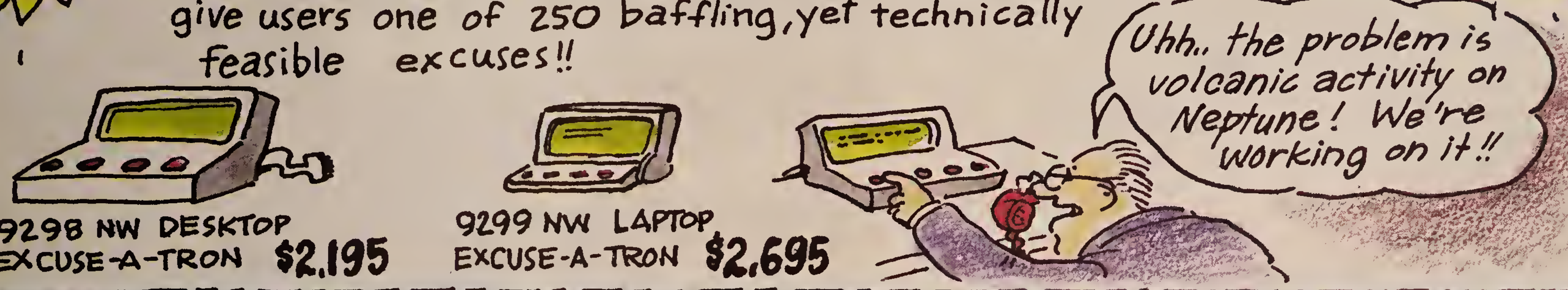
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